TECHNOLOGY DEPT.

Gas Journal

Vol. 267. 103rd Year. LONDON, SEPTEMBER 5. 1951. No. 4605. Price 1/-

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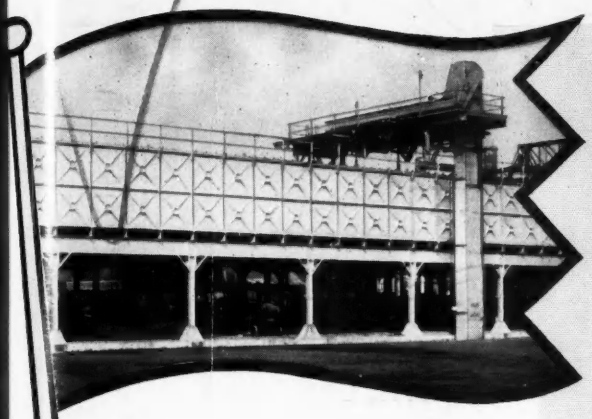

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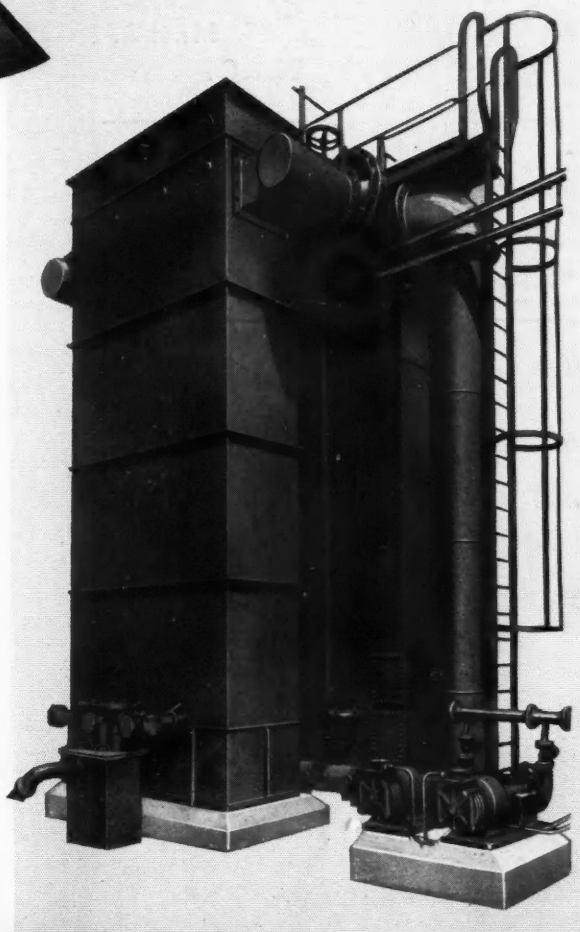

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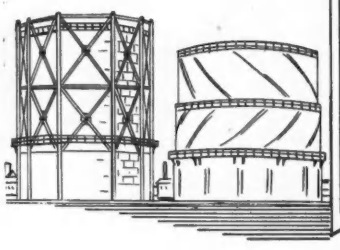
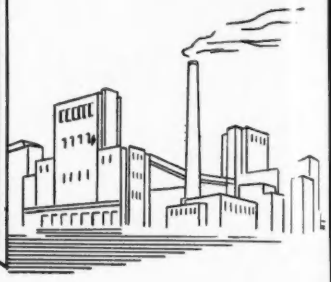


GAS WORKS
COKE OVENS
CHEMICAL WORKS



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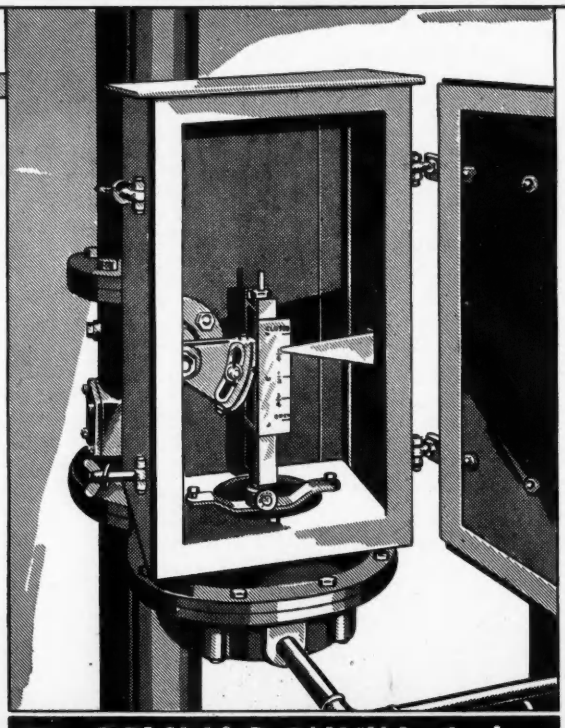

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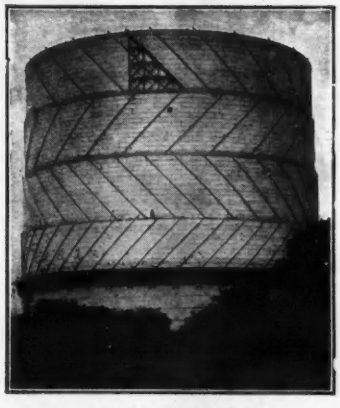

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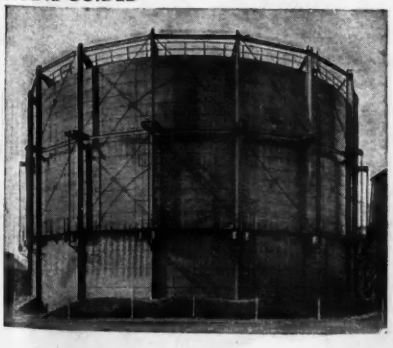

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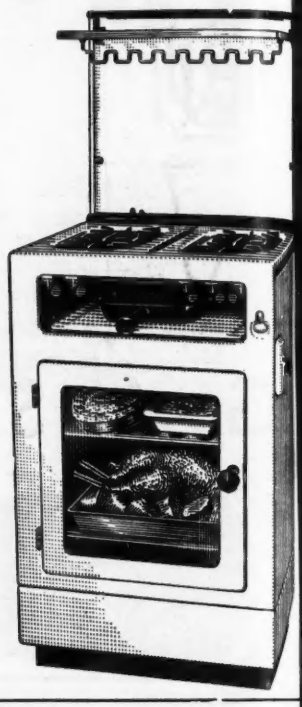

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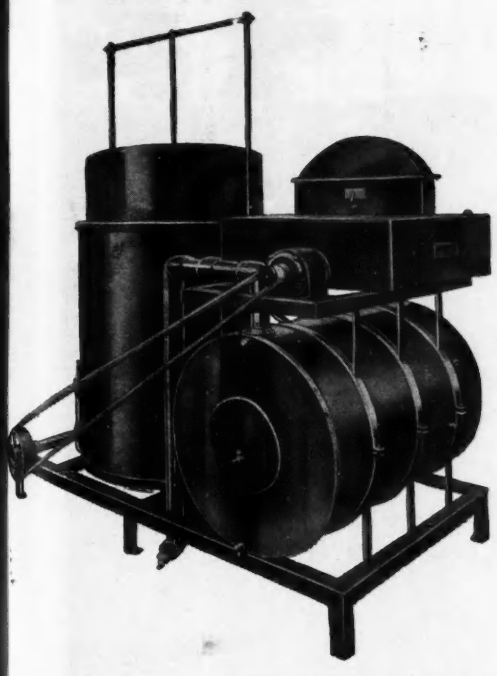

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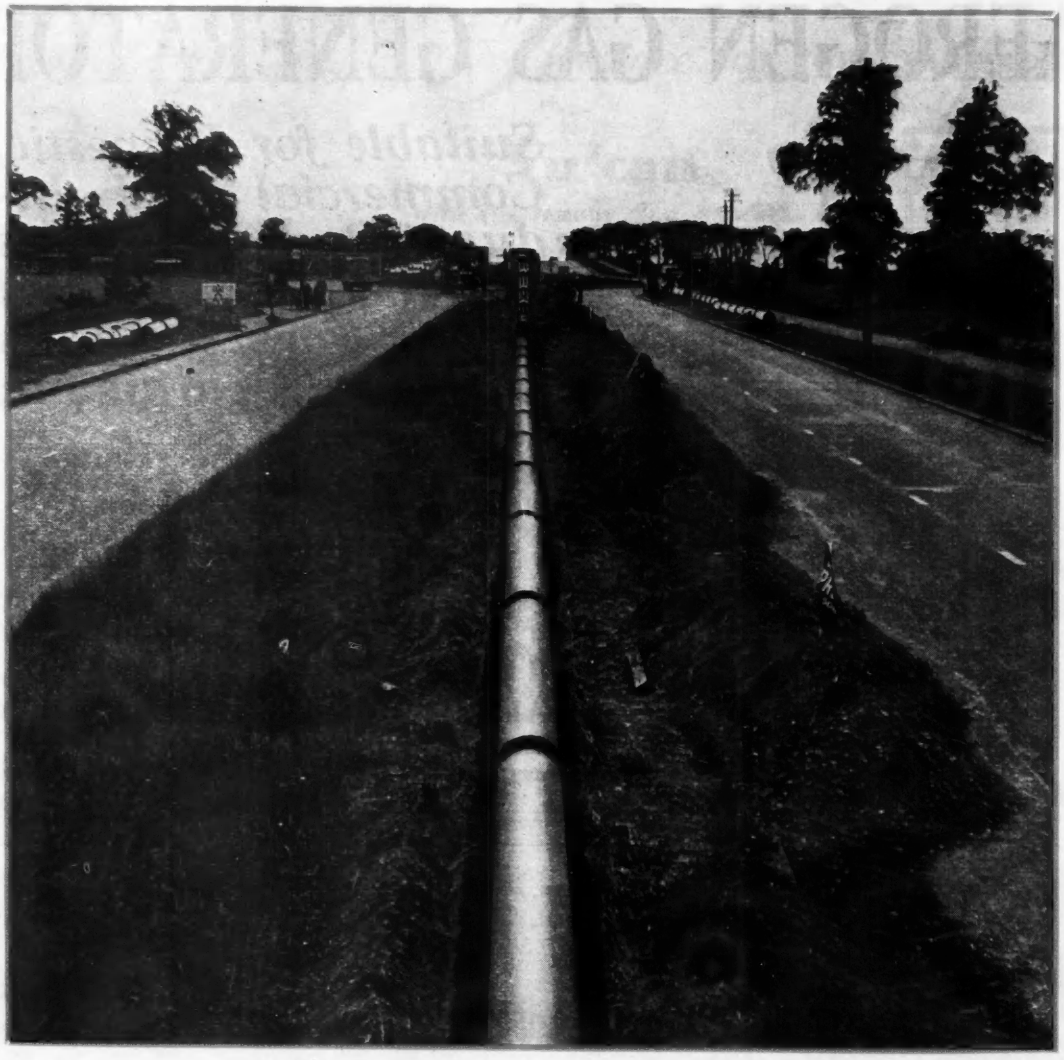

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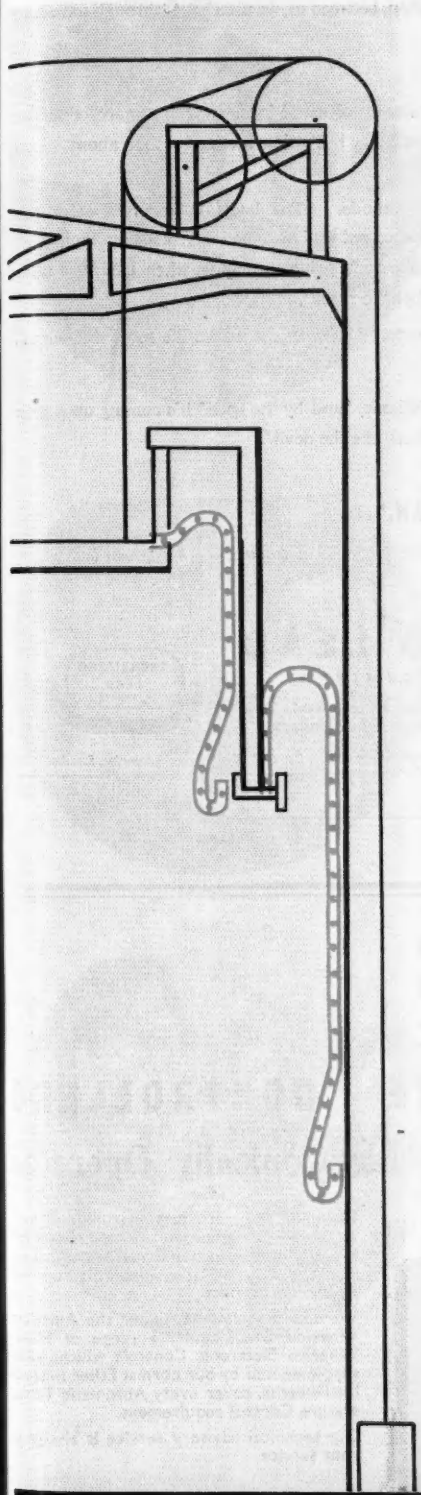

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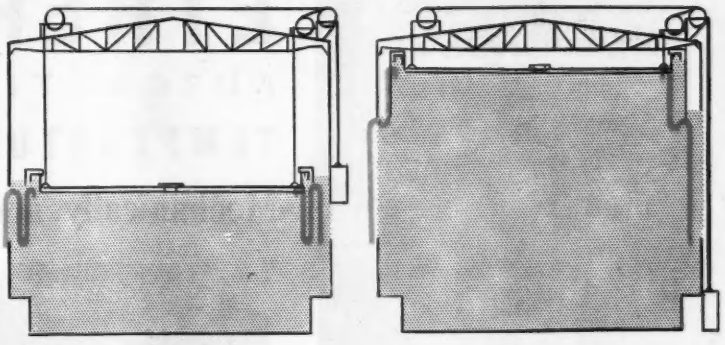

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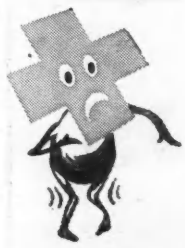

'Rusting's not what it was', said the Anode. 'Remember when, between us, we used to get through something like £900,000,000 worth of iron and steel every year?'

'And worth three times that now', said the Cathode.

'These corrosion committees', said the Anode, spitting a stream of metal ions. 'Importance of surface preparation and red lead priming. Anodic suppression . . . ! Putting ideas like that about. How are we expected to live?'

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'I give up', said the Anode. 'Science just makes life more difficult . . . What's that noise?'

SAID THE ANODE TO THE CATHODE

'Sounds like a brush to me', said the Cathode, 'and by the speed it's coming up it must be using that new paint. Brushes out fast and covers like the devil'.

'Look out!', said the Anode.

'*This is it*', said the Cathode—**'RUSTODIAN.'**

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*An iron surface is never perfectly uniform and in the presence of moisture a number of electric cells form on its surface. Iron dissolves from the anodes causing progressive corrosion and pitting. At the same time, in certain circumstances, (such as in the presence of sodium salts from sea water), chemical compounds forming at the cathodes tend to destroy the paint film. Rustodian suppresses electrolytic action at both anodic and cathodic areas, and therefore retards the destructive effects arising from these causes.

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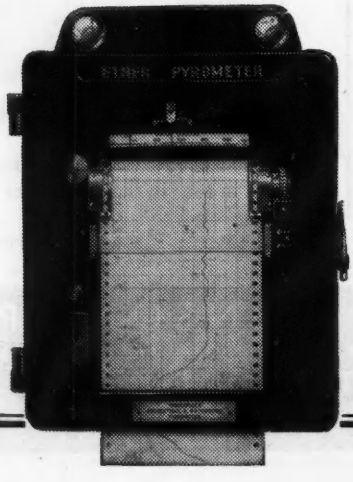

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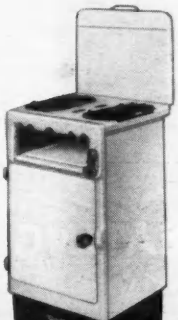

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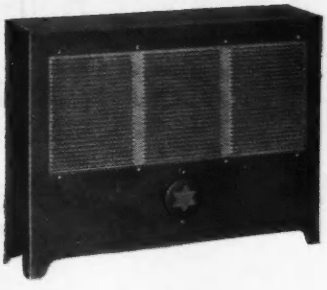

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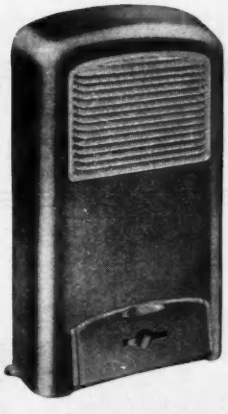

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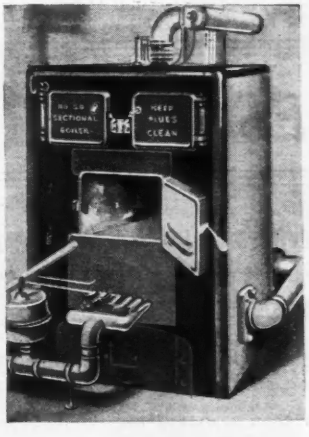

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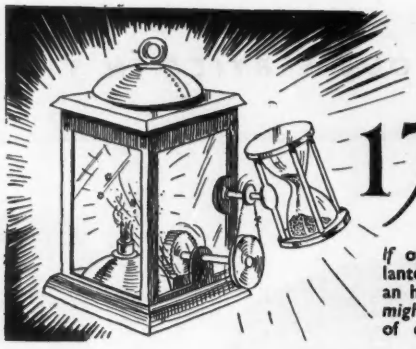

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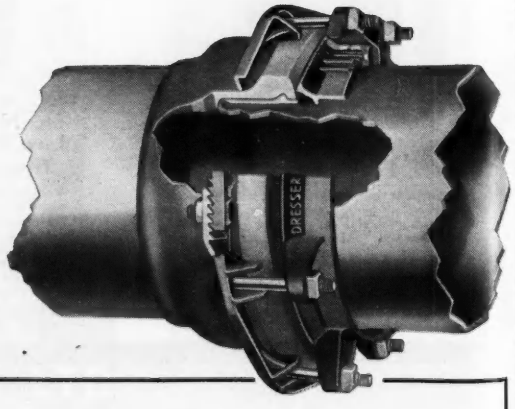

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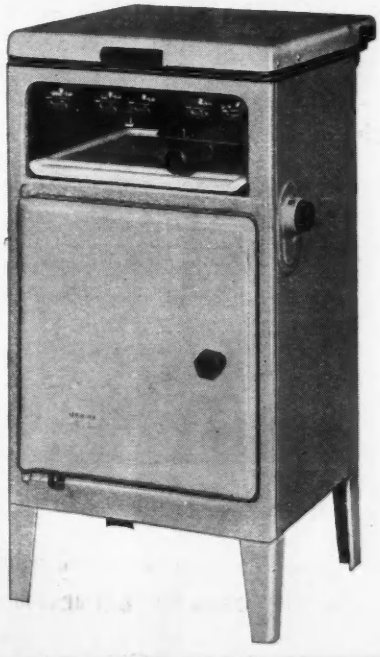

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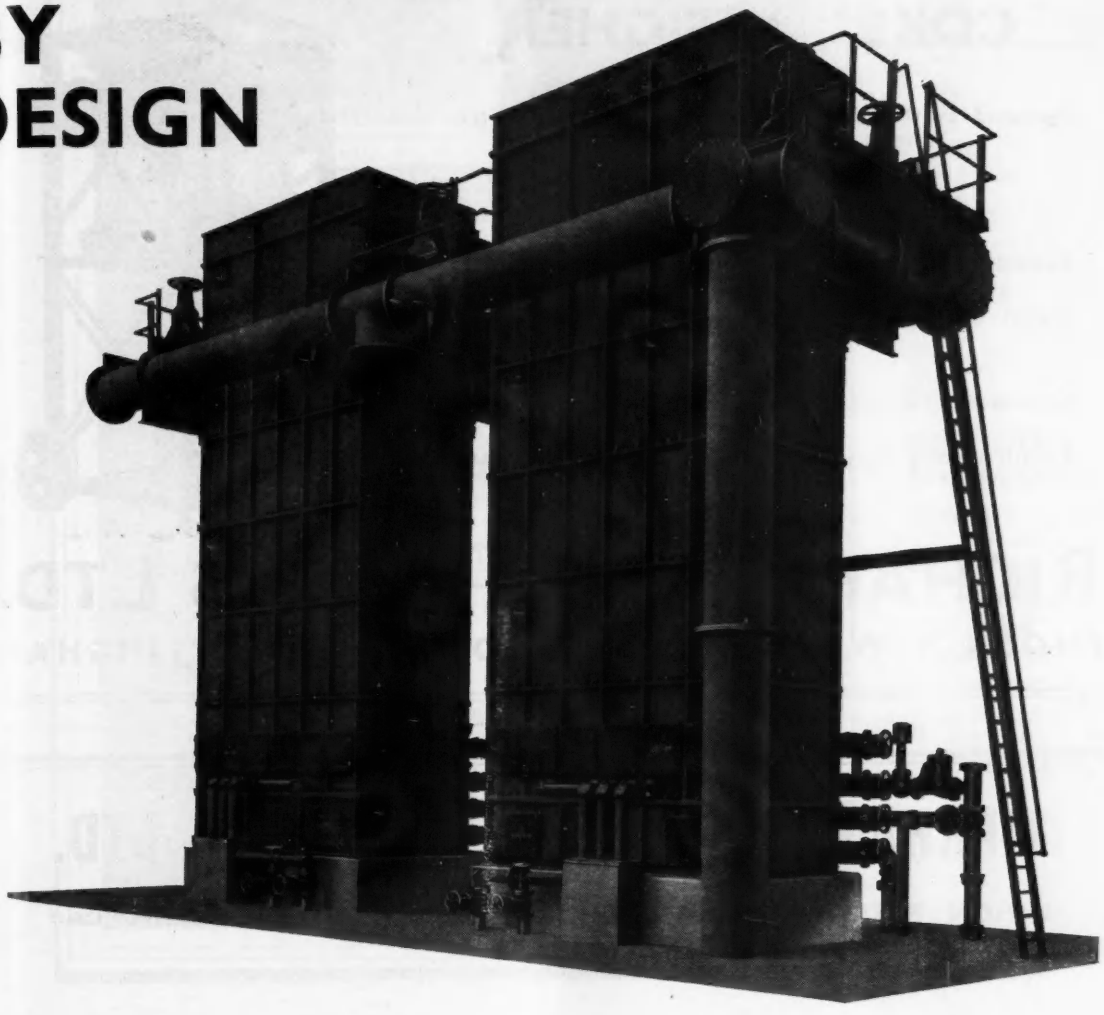

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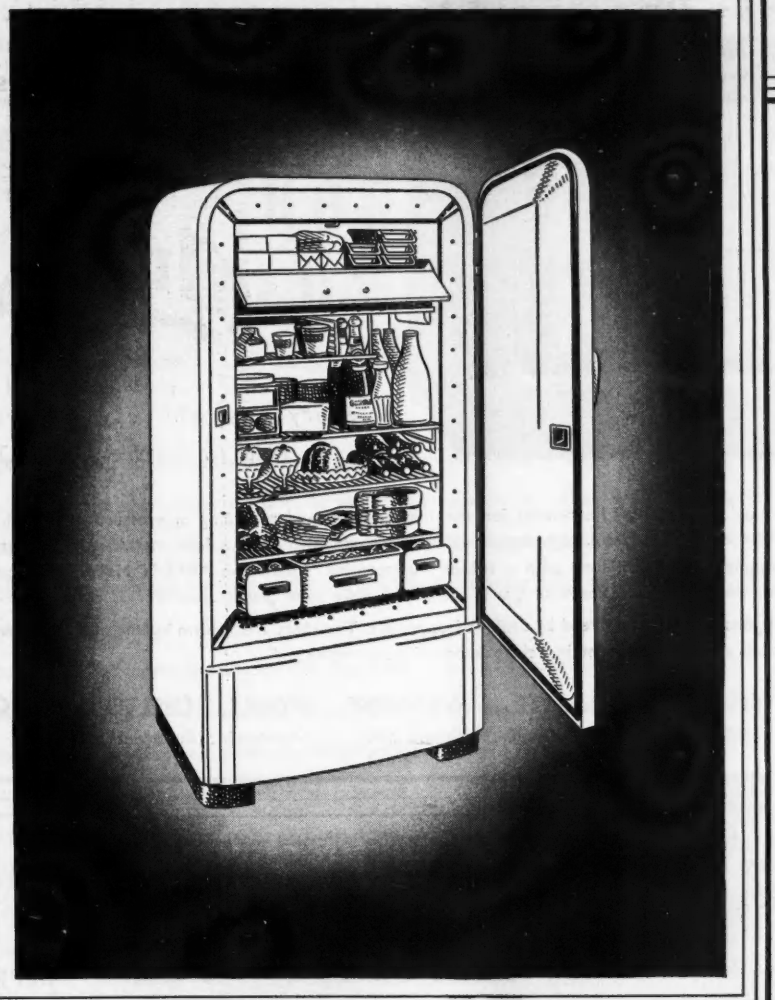

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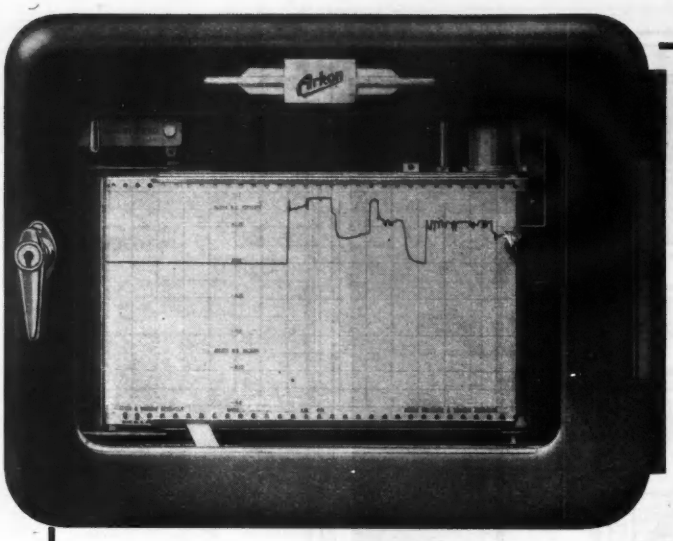

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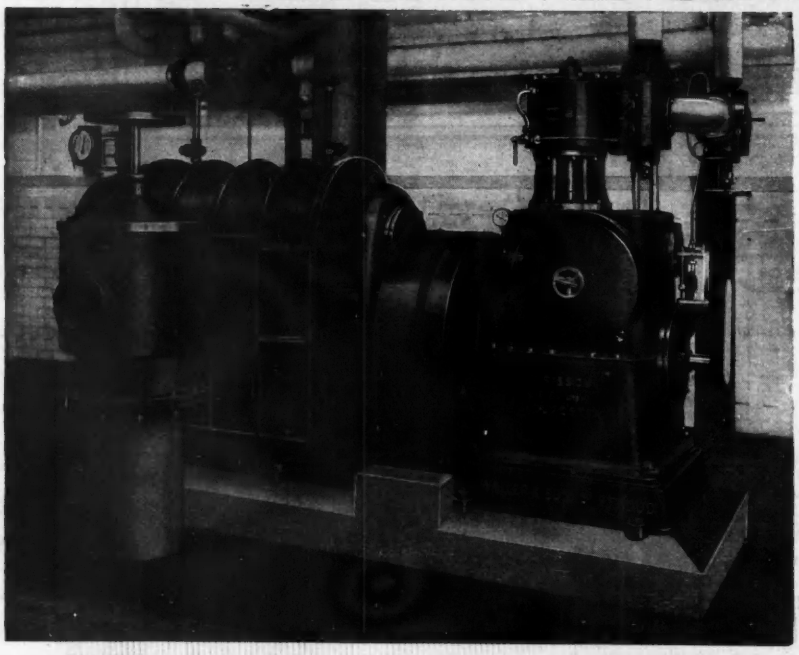

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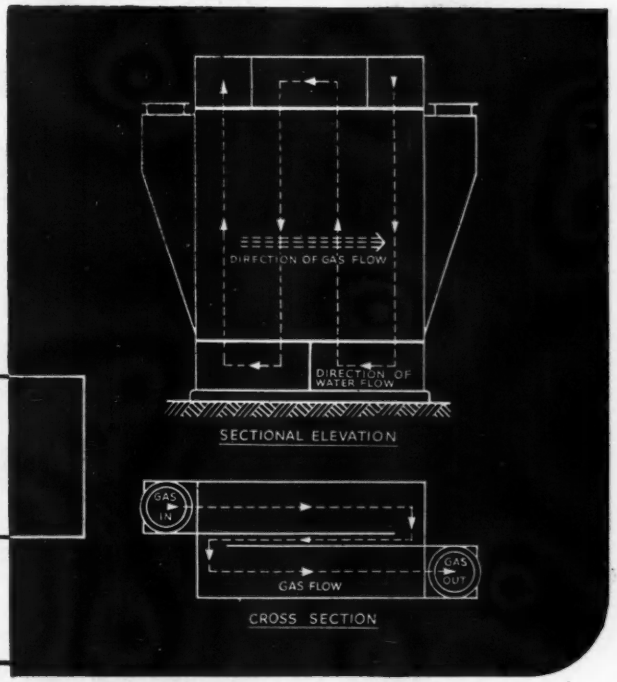

Diagrammatic arrangement of a Whessoe vertical tube horizontal gas flow condenser.

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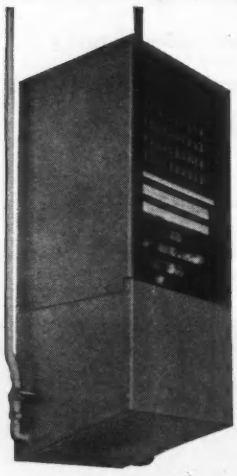

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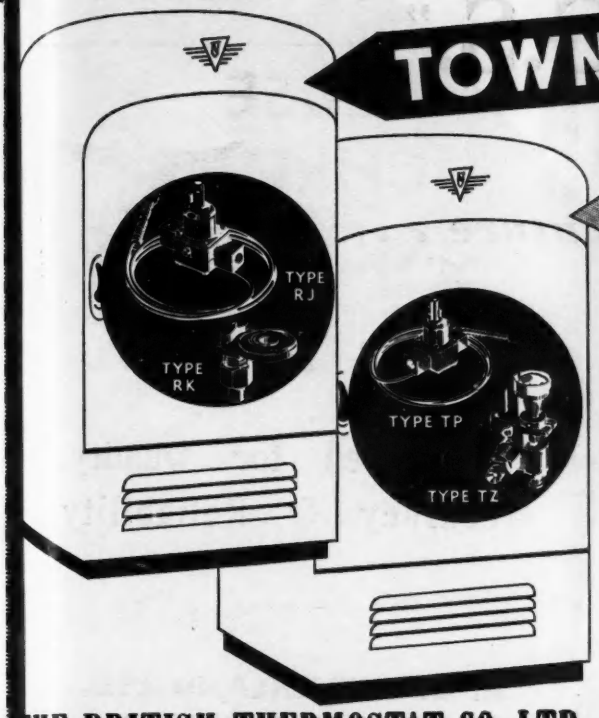

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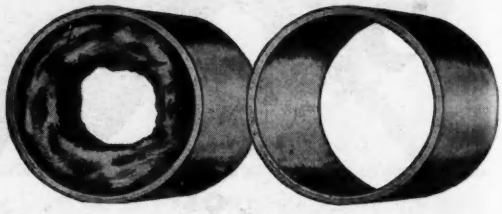

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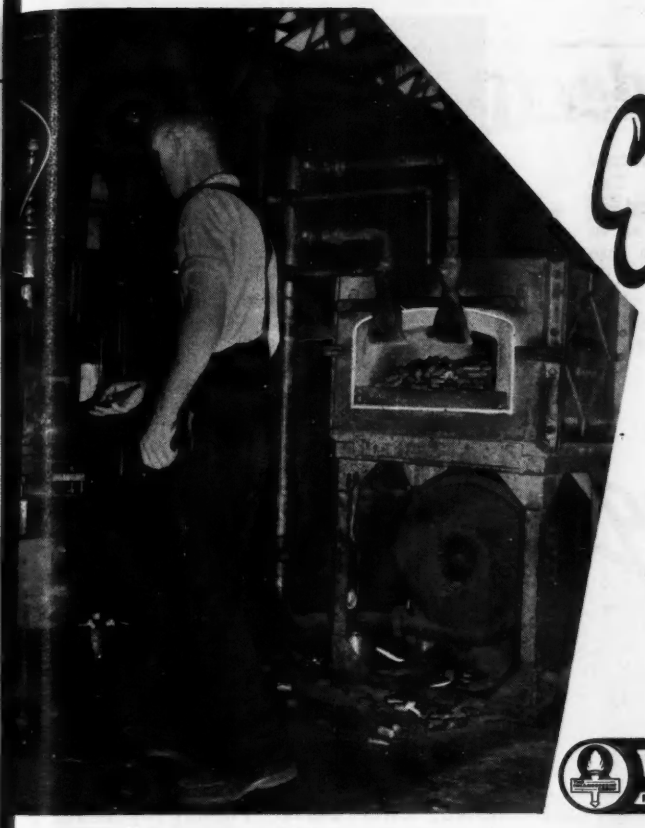

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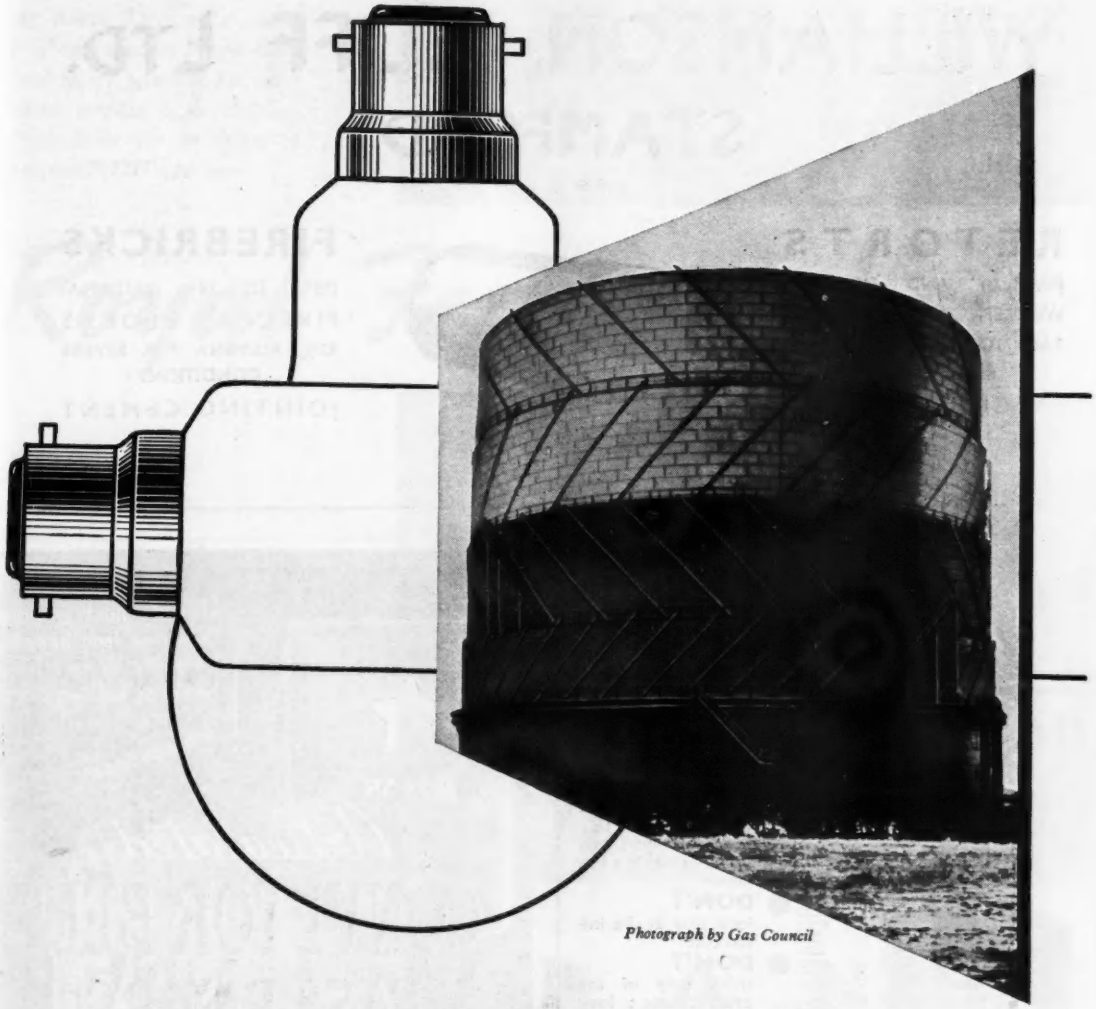

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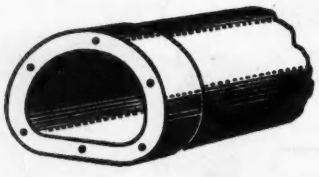

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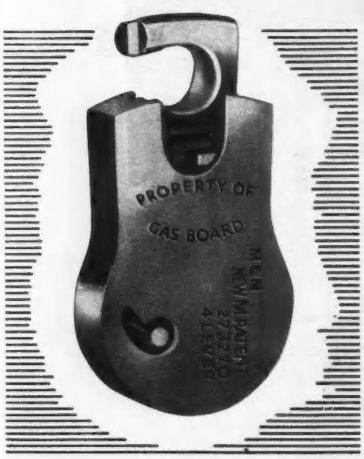

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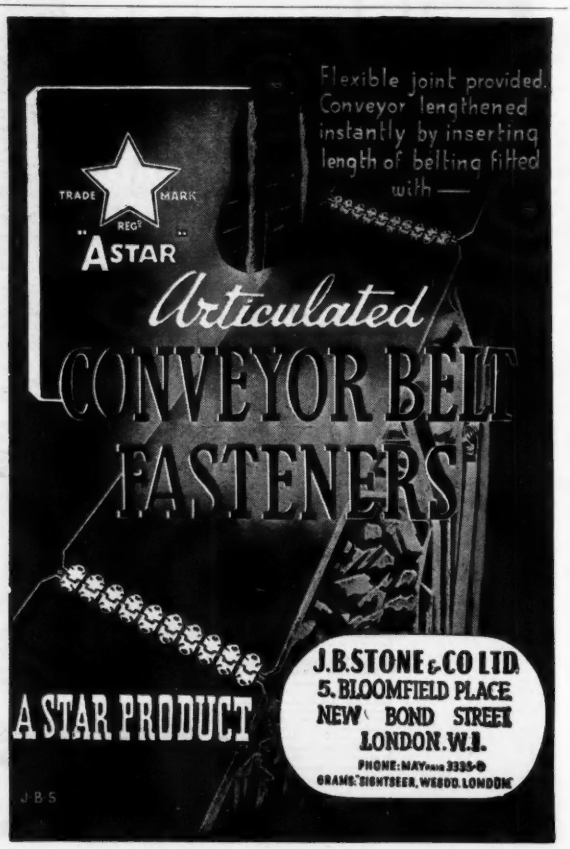

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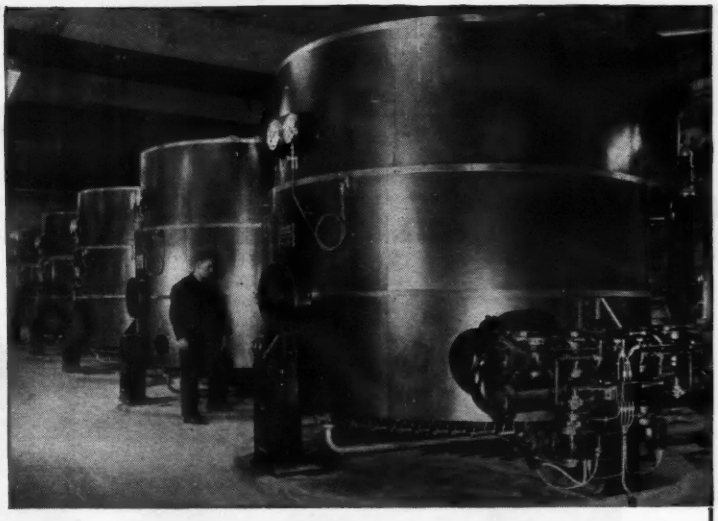

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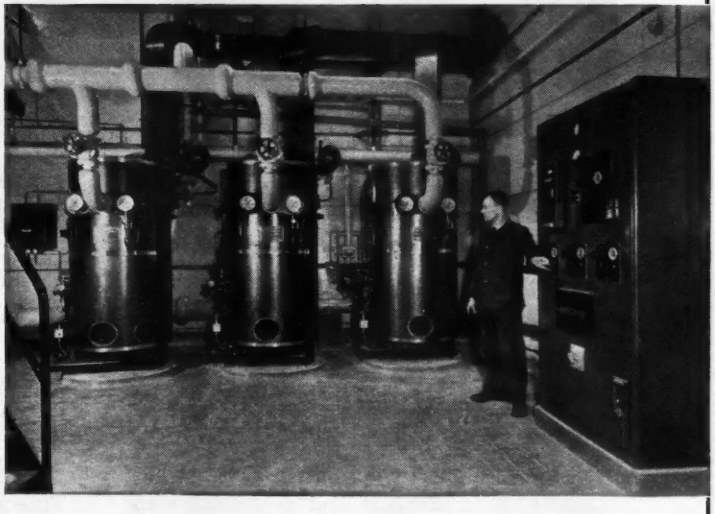

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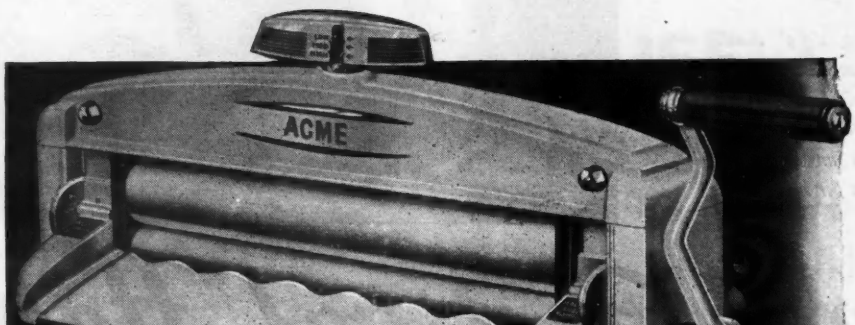

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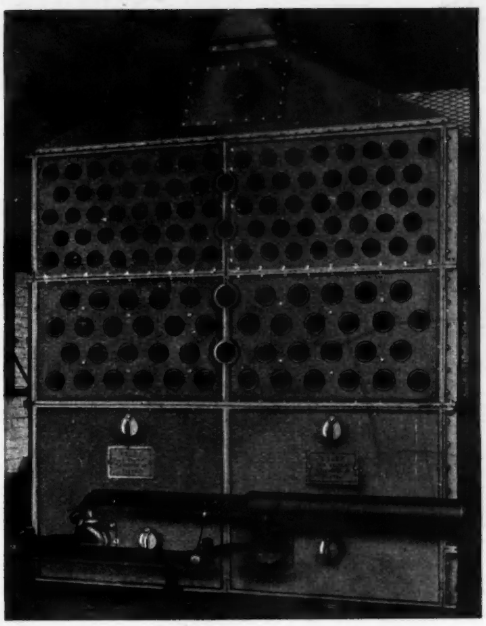

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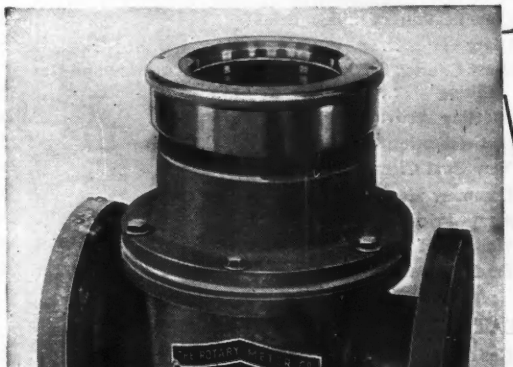

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GAS JOURNAL

VOL. 267. NO. 4605 103RD YEAR SEPTEMBER 5, 1951

FUEL COSTS AND USE

THOUGH presenting a broad and not necessarily a very accurate picture, for costs and conditions of fuel supply vary almost weekly and are unpredictable, the Social Survey published by the Central Office of Information on the domestic utilisation of heating appliances and expenditures on fuels in 1948-49 is of direct interest to and should be studied by the gas industry. We should perhaps explain that most of the surveys carried out by the Government Social Survey are planned with limited terms of reference, and the majority of the reports based on them are concerned with the applications of the data gained referred to the Survey by the commissioning department. Normally these reports are restricted to circulation within government departments. At the request of the Department of Scientific and Industrial Research the Social Survey re-examined data of a confidential nature with a view to providing material which would enable them to assess the efficiency of the improved heating appliances they were engaged in developing in relation to the expenditure of households on fuels of various kinds. A report was prepared and presented to the D.S.I.R. in 1950. The data are now generally available (C.O.I.), and are reproduced in the report to which we refer and of which Mr. Leslie T. Wilkins was author.

It is explained in the report, which is quite a voluminous one presenting a mass of figures into which we will not enter in detail here, that the data should be regarded as a ' pilot study,' giving information which may serve till they can be replaced by data from more comprehensive and vigorous enquiries, or until they are obviously out of date. All the basic data, except for the figures regarding the possession of various forms of solid fuel, gas, and electrical appliances, are taken from material not normally used, and there are many gaps. The main source of the information set out was a ' general population ' sample of households in England, Scotland, and Wales. Over 2,600 households were visited by trained interviewers. The sample was designed to be representative of the whole country, except that in the final issue householders who received ' miners' coal ' were excluded. There must always be an element of uncertainty associated with the method employed, but the report is at pains to stress that it should not be concluded that expenditure data are not accurately obtainable by sample survey methods or that such methods are not often the best or only way of obtaining much of this sort of information.

As we have said, the figures are there for all who wish to study, but we would like to call attention to a few of the general conclusions reached. The analysis is certainly interesting, but again we are concerned as to what accuracy, from the angle of nation-wide fuel users, can be placed on the sample method. We find that only 7% of the households in England, Scotland, and Wales in 1948 were without gas or electricity; 66% had both services; 13% had electricity but no gas. The coal fire was the most popular form of space heating, only 2% of the ' sample ' not having a coal fire in their main living room. The coal fire, it is stated in the report, was ' relatively unpopular in bedrooms.' This is surely understandable, but it is certainly surprising that all but 24% of the householders had one in their main bedroom. Again, the report states, the electric portable fire was the most popular form of auxiliary heating. The whole pattern of heating in the British household has changed largely since 1942 in that more space is being heated for short periods. There are many well-known reasons for this, and in point of fact part-time space heating doubled during the period 1942-48—a matter of six years only but an outcome

traceable to the effects of war and movement and distribution of labour, and, of course, economic conditions generally. It may be said that the pattern of heating has followed the pattern of living—inevitably so. A further surprising feature of the report is that there was no evidence of the younger housewives tending to turn away from the use of solid fuels in favour of other forms of heating. The main factor in preventing people from using 'cleaner' fuels is the capital expenditure involved—and here we run up against purchase-tax. As for improved solid fuel appliances, besides needing capital outlay, they often require some modification to the hearth structure, and only about a quarter of the householders are buying or own the house in which they live. The tendency is for householders to accept the appliance provided.

The Social Survey report ought not to be criticised because of its limitations. It had a set purpose, and those responsible for it were obviously unbiased and related without personal prejudice the facts as they found them. But here again we have a report which, if its significance is realised, calls for a much more cohesive and knowledgeable policy in the interests of coal conservation. And it points unmistakably to the immense scope which lies before the gas industry in this one phase of the domestic field. The problem is intricate. It involves the question of supply and demand; it brings into the picture the peak load. But the problem is not insoluble, and a nationalised gas industry should be able to offer at any rate a partial solution. It should certainly state its views clearly on the space heating load and determine that these views will have real weight in a national fuel policy.

COAL ASSAY ON WHAT SCALE?

THERE have been many attempts to devise a small scale test plant to enable the carbonising engineer to forecast in a short time and from a convenient sample the results he might expect to obtain in the retort house with coals offered to him for gas-making. In the old days, the test plant, consisting of a cast-iron horizontal retort taking a charge of about 2 cwt., complete with its little purifying plant, was a common sight on the works. The conditions of working in the test plant were not very different from those in the retort house and as long as one did not push quantitative inferences too far the indications obtained were useful and practical.

The plant in use at Birmingham, so ably described by Mr. B. H. Cunningworth in his paper to the Institution, is an immense advance on this, but it is still essentially in the same class. The charge is reduced to 30 lb. and the retort is made of cronite and can be safely used up to 1,150°C. The purification train is carefully designed for close and accurate measurements; but unfortunately we are not yet told the variations in the correlation factors connecting the results with those obtained on the works in the several types of carbonising plant there in use. Provided that the coals tested are in the same class there seems no reason why the correlation factor between test plant and retort house should not be pretty constant for 'straight-gas' retorts. And if the calculated H.E.V. can be relied upon it should not be difficult to work out corresponding results even when steaming in continuous verticals, though it should be noted that Mr. Cunningworth does not himself anticipate 'that even with a correlation factor the small-scale static carbonisation method will displace the large continuous vertical retort test unit.' It is only when it is sought to cover a wider field that serious doubts arise. It would be a pity if some such form of assay plant as this were to be standardised and adopted to take the place of a real test in full-scale plant to settle such questions as 'whether a particular coal is being carbonised in the most suitable type of plant' or to assess authoritatively the gas-making properties of gas coals.

It is not necessary to remind such experts as those who took part in the discussion that there is for most coals a critical temperature at which thermal gas yield reaches the optimum and that gas-making results are affected in an indeterminate proportion by such factors as coal size, weight of charge, time of treatment, equivalent to speed of travel through the continuous vertical, and in the latter type of plant by the magnitude and rate of variation in the minor axis of the retort. If, therefore, results in the retort house show wide variations, it does not appear reasonable to expect a constant correlation factor between these and the test plant. The small scale test plant has its uses, if only as an extension of the proximate analysis. The Gray-King assay 'coke sticks,' for instance, are perhaps as useful as the standard coke button, but even the authors of this apparatus admit that direct correlation with results obtained from the same coal in gas retorts is not possible—'the yields in gasworks practice depend so largely on the size and grading of the coal charged as well as on its treatment in the retort, etc.' But the function of the small-scale test plant was, we submit, to assist in the valuation for purchase of relatively small loads of coal for one undertaking.

The position today is that coals will be allocated to the Industry as a whole and selected by the area boards in very large quantities. The proportion, therefore, between the small-scale test plant and the individual undertaking is probably not very different from that between a full-scale carbonising unit and the area board. When you are working at the nation-wide scale a test of 50 or 100 tons extending over four or five days is not, we submit, out of proportion. The institution of several such test full-scale carbonising units is far more to be desired than the evolution of a small-scale 'standard' coal test assay which at best has only a limited application.

There is a further immense advantage in the setting-up of full-scale carbonising units of various types about the country. They could be used for those investigations into optimum working conditions which we have previously advocated. They would not only give us definitely all the necessary data about the coals avail-

able, but they would enable us to ascertain at what calorific value, at what output per retort per day, under what working conditions, the optimum results can be obtained from any given coal under test. We repeat that this type of data is not yet available in spite of all the work done and published by the Fuel Research Board and other investigators. It is information far more valuable than merely the results to be expected when working under some particular fixed set of conditions.

AUSTRALASIAN GAS SALES

EFFECTS of the prolonged strike of coalminers during the winter of 1949, which necessitated severe restrictions on the use of gas supplied by many Australian gas undertakings, are shown in the statistics of the Australian gas industry for the year 1949, compiled and issued by the Statistical Department of the National Gas Association of Australia. The total amount of coal carbonised, estimated at 1,873,000 tons, was 5.1% less than the quantity used in 1948, when supplies were insufficient to meet the full demands of the Industry. Gas manufacture was reduced by 5.2% and the output of coke and tar was considerably less than for the previous year. Sales of gas by Australian undertakings were approximately 30,320 mill. cu.ft., which was 5.3% less than the record figure of 32,030 mill. cu.ft. sold in 1948, but exceeding 1939 sales by 59.8% While coal supplies were reduced, the number of consumers of gas increased during the year 1949 by approximately 2% bringing the total number of consumers' meters in commission to 1,135,000, as against 1,113,000 at December 31, 1948, and 903,000 at December, 1939. Average sales per meter, which had steadily risen from 23,000 cu.ft. in 1940 to 30,800 cu.ft. in 1948 for Australian metropolitan areas, fell to 8,700 cu.ft. in 1949. A decline also took place in the sales per meter in Australian provincial areas, in which average sales had reached 25,400 cu.ft. per meter in 1947 but were reduced to 22,900 cu. ft. in 1949. The average sales through domestic meters declined from 25,000 cu.ft. to 23,500 cu.ft. per meter in metropolitan areas, and from 20,400 cu.ft. to 19,400 cu.ft. per meter in provincial areas.

These figures relate to the Australian gas industry as a whole. As between undertakings, results differed considerably: in some areas the quantity of coal received during 1949 slightly exceeded that for the previous year, whereas in others the reduction in supplies was as much as 12%, resulting in protracted period of gas rationing and decreases in sales of gas and by-products. On the statistics made available by gas undertakings, the average number of persons employed in Australian gas undertaking during 1949 is estimated as 10,980, as against 11,100 in 1948, and 9,740 in 1939. Salaries and wages paid were approximately £5,351,000, which was 6.3% more than for 1948, and 96.8% more than for 1939. The limited information from New Zealand gas undertakings indicates that sales of gas in New Zealand during 1949 were slightly below sales for the previous year and 29.5% above 1939 sales. Statistics for 1949 were supplied by all gas undertakings in Australian metropolitan areas and by 56 provincial undertakings which represented 85% of the total gas made in provincial areas. Nineteen undertakings, representing 67% of the total gas manufactured in New Zealand, also supplied statistics for 1949.

MUCH LEARNING

AN astonishing diversity of of subjects is covered by London County Council evening classes. The annual guide to further education in London ('Floodlight'—published by the L.C.C. at 9d.; 1s. by post) devotes 50 pages to an alphabetical list of some 500 subjects taught, among them gas engineering at the South East London and Westminster Technical Colleges in preparation for the examinations of the Institution of Gas Engineers and the City and Guilds of London Institute; and gas fitting at Paddington, South East London, and Wandsworth Technical Colleges. As those who have previously attended at L.C.C. institutes have discovered, they are not merely places of instruction; they are also clubs with an active social life, a friendly spirit, and a community interest. In addition to the guide to evening classes, there are details in 'Floodlight' of day vocational courses, again including gas fitting at Paddington and Wandsworth, together with the addresses of the 200 colleges and institutes where all this learning and activity take place. There is practically no subject one cannot take from accountancy to zoology. Whether one wishes to build a barge, to become a master chess-player, to learn Esperanto or face massage, lip reading or lithography, judo or pigeon breeding, the L.C.C. will provide instruction. There is even a class for bamboo pipe playing should anyone be courageous enough to want to play a bamboo pipe.

1951 'Journal' Directory

THE following changes have been notified during the past month. To keep the information in the 1951 edition of the *Gas Journal Calendar and Directory* up to date readers are invited to note these alterations (together with the appropriate adjustments relating thereto in the 'Personnel' section, pp. 137-152):

Page 21.—EASTERN GAS CONSULTATIVE COUNCIL: Add C. H. Frewer (Norwich) *Member.*

„ 21.—NORTH EASTERN GAS CONSULTATIVE COUNCIL: Add Councillor W. Holdsworth (Dewsbury), Councillor C. Smart (Leeds), Councillor W. Hipwell (Market Weighton), Councillor Mrs. M. Knowles (Bentham), and the Rev. J. C. Dupuis (Thirsk), *Members.*

„ 22.—SOUTH WESTERN GAS CONSULTATIVE COUNCIL: Add Councillor L. N. Deeley, B.Sc. (Crewkerne), *Member.*

Page 23.—SOUTHERN GAS CONSULTATIVE COUNCIL: Delete R. Bates (Purbrook), *Member* (resigned), and substitute Mr. J. N. Cantelo (Southampton), *Member.*

„ 54.—NORTH THAMES: Add Windsor and Ascot Districts, J. G. Abbott, *Manager.*

„ 71.—HOUGHTON-LE-SPRING: Delete G. W. Maryin, *M.* (retired).

„ 81.—SUSSEX DIVISION: L. G. Humphrys, formerly *Local Manager*, Bexhill, now *Engineer*, North Sussex District.

„ 113.—WALSALL DISTRICT: S. H. Lawrence, *E. & M.*

„ 157.—DONAGHADEE: Delete W. H. Roberts, *Managing Proprietor* (deceased).

„ 177.—WOMEN'S GAS FEDERATION: Miss O. L. Humphries, *Chairman*, vice Miss C. E. Ellington-Wright.

Letter to the Editor

A QUESTION OF ECONOMICS

DEAR SIR,—'It is economically sound to install £5,000 worth of machinery to save three men.' Thus states Mr. Oliver Lyle (*Gas Journal*, August 22). He is wrong. I do not question his figures. My point is that comparison between men and money is not a matter of economics. The erroneous belief that mechanism saved man-power has done incalculable harm to British industry. As each generation comes into being, it imbibes this false doctrine, and grows up antagonistic to mechanisation—so much so that when new machinery is about to be installed it is met thoughtlessly with strikes, or otherwise given a sulky and unwelcome reception, to the great detriment of our national economy at a time when our overseas competitors welcome mechanisation.

Machinery is merely tackle and new machinery is but improvement on existing tackle, and therefore should be welcomed. The cost of its adoption must be compared, not with men, but with its ability to produce the merchandise, the better to sell in a wider market, for the benefit of all of us.

I make an earnest plea, for doing away with such phrases as labour saving and saving of man-power.

Yours faithfully,

H. J. TOOGOOD.

43, Uxbridge Road, Hampton-on-Thames.
August 28, 1951.

Personal

The Pulsometer Engineering Co., Ltd., announces the appointment of the following Directors: **Sir Felix Pole,** who will take the chair at Board meetings in place of Mr. Eliot Hodgkin, who has resigned; **Mr. R. G. W. Bliss,** and **Mr. A. V. Price. Mr. J. Elliott** has been appointed Secretary.

◆ ◆ ◆

Mr. **W. H. Powell,** the Executive Transport Manager for Falk, Stadelmann & Co., Ltd., has been appointed a member of the transport users consultative committee (representative of industry) for the London area in place of Mr. E. W. Rainer, deceased. Mr. Powell is in charge of Falk, Stadelmann's home transport, shipping, and the co-ordination of transport for most of the firm's 12 works.

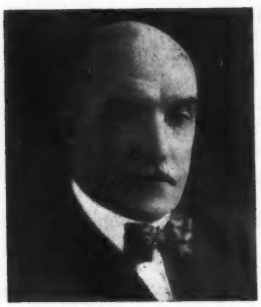
◆ ◆ ◆

Mr. E. A. Goodland, Manager of the Walsall District, West Midlands Gas Board, and formerly Assistant Manager of the Birmingham Gas Department, has been appointed General Manager of the newly-formed United Sulphuric Acid Corporation, which is to manufacture sulphuric acid at a factory to be built at Widnes. During his period of service in the midlands he has been closely identified with the local branches of the Institute of Fuel and the Institution of Chemical Engineers, and is a member of the Council of the Birmingham Centre of the Institute of Industrial Administration.

Obituary

Lieut.-Colonel HAROLD W. WOODALL, C.I.E., M.I.C.E., M.Inst.Gas E., M.Inst.Water E.

THE gas industry has lost a well-known figure in the death on August 28, at Waterston Manor, Dorchester, Dorset, of Lieut.-Colonel Harold W. Woodall at the age of 79.



Second son of the late Sir Corbet Woodall, he first entered the gas industry (having previously been assistant electrical engineer to the Hampstead vestry) in 1897 as assistant to the distribution engineer of the Gas Light and Coke Company, an appointment which he resigned after twelve months. For 19 years, until his retirement in 1920, Harold Woodall was Engineer and General Manager to the Bournemouth Gas and Water Company, during which time he transformed the Company from a small concern of no more than 300 millions output into an extensive undertaking covering 200 square miles and selling 1,300 mill. cu.ft. annually. He was largely responsible for the erection of new works at Poole, admitted to be one of the finest in the country. After his retirement his assistance was still retained in a consultative capacity, and it was not surprising that two years later he was elected to a seat on the Board.

It was, of course, during his period at Bournemouth that in conjunction with Mr. (later Sir Arthur) Duckham he developed the then novel system of continuous carbonisation in vertical retorts; and those of our readers who have Volume 98 of the *Journal* by them may be interested to refer to the account we published on page 638 of the issue of June 4, 1907, of this considerable advance in gasworks practice. The following year a setting was brought into production at the Nine Elms Works of the Gas Light and Coke Company, and within five years the new system had been installed in over 40 gasworks in all parts of the world.

Following his retirement from the Bournemouth Company, Harold Woodall set up as a consulting engineer in the firm of Sir Charles Bright and Partners. In 1923 he relinquished his interests in the Woodall-Duckham Companies (which he founded) and devoted himself solely to the gas undertaking side of the industry. In 1932, however, he was invited to join the Board of Parkinson & Cowan, Ltd., as Chairman and Managing Director in succession to the late Sir Henry Cowan—a position he held until his retirement owing to ill health in 1948, when he was succeeded by Sir George Jessel, Bt., M.C., the present Chairman. He was also a Director of Newton Chambers and Co., Ltd., and Wellman, Smith Owen Engineering Corporation, Ltd., for a long period. During the first world war he was for over three years A.A. and Q.M.G. to the 1st (Peshawar) Division on the north-west frontier of India. He was Chevalier de la Legion d'Honneur. In the last war Colonel Woodall was Southern Regional Controller of the Ministry of Fuel and Power.

MR. FRANCIS B. RICHARDS writes: It was a kindly fate that brought Harold Woodall and Arthur Duckham together at the Old Kent Road works of the South Metropolitan Gas Company. A close friendship sprang up between these two young men of kindred tastes and similar outlook, which was broken only by the untimely death of Arthur Duckham.

Harold Woodall having been appointed at an early age Chief Engineer and General Manager of the Bournemouth Gas and Water Company, was soon joined by his friend Arthur Duckham who became his assistant. Together they planned the modernisation of the gas industry and set out to make Bournemouth an example of what a gas undertaking should be. The publication of an account of the work of Settle and Padfield at Exeter inspired these two young men with ideas which led to the development of the Woodall-Duckham system of continuous carbonisation in vertical retorts. To these two ardent spirits every difficulty presented an opportunity and every obstacle to progress arose only to be overcome. Their attitude of mind was tersely summed up by Duckham in a moment of dire adversity when he said to us 'Cheer up! every knock's a boost!'

For Harold Woodall the days at Bournemouth were happy days—his heart was in the country and he was able to combine his love of field sports with his zeal for work. It was the accident of a friendship in the hunting field between Harold Woodall and my father which afforded me the opportunity of taking part in the development of the new system of carbonisa-

tion and thus brought me within the field of influence of two remarkable men who were to mould my life; I am truly grateful to them.

To Harold Woodall life was a great adventure; nothing was commonplace, nothing unworthy of interest. He had the gifts which make a leader of men. To some it has been a matter of regret that his retiring disposition kept him aloof from public life, in which, had he chosen to do so, he would have made his mark. Perhaps he chose the better art! He was especially happy in his marriage to a life partner who shared to the full his love of the country and its peaceful pursuits. To those who were so fortunate as to enjoy his friendship he was always the same charming companion and perfect host—in short an English gentleman.

He inspired others with his own high ideals and lofty enthusiasm. He leaves many of us the richer for having known him; the better for having been brought within the influence of his lovable personality. His name will live in the industry to which he devoted his life.

◆ ◆ ◆

Manager of the Horncastle (Lincs.) gasworks for 19 years until his retirement about 10 years ago, Mr. **Thomas W. Dodds,** aged 75, has died in Workington Hospital, Cumberland. His son, Mr. T. W. Dodds, is the present Manager of Horncastle gasworks.

Sales and Service Conference Plans Almost Complete

Attendance figures of delegates to the forthcoming Sales and Service Conference, organised by the Gas Council, already exceed 600 and it is anticipated that these may approach 800 in the event.

The official programme is nearing finalisation and, with the exception of some slight amendments, will be issued in the very near future. The four business sessions are sub-divided in association with specific aspects:

(1) First business session: 'Consumer Service.'
(2) Second business session: 'Marketing.'
(3) Third business session: (a) 'Manufacturers and the Industry,' and (b) 'Aspects of Home Service.'
(4) Fourth business session: 'The Consumer and the Gas Industry.'

The programme of this three day event (October 23-25) was outlined on p. 334 of the *Journal* for August 8. Applications for more detailed information should be forwarded to Mr. R. J. Gregg, Publicity Manager, the Gas Council, 1, Grosvenor Place, S.W.1.

CLASSIFICATION OF SILICA BRICKS

DURING the past few years the Coal Carbonisation Plant Committee, which is responsible for the progressing of construction of coke ovens and carbonising plant, has experienced confusion between makers and users of refractories on the meaning of silica bricks, siliceous bricks, semi-siliceous bricks, and firebricks. The Ministry of Supply—which had responsibilities in this field before the Ministry of Materials was formed—was asked to ascertain whether agreement could be obtained between the interested organisations and has now reported to the committee as follows:

Silica bricks.—Bricks containing at least 92% silica.

Siliceous bricks.—Bricks containing 85 to 92% silica.

Semi-siliceous bricks.—Bricks containing 78 to 85% silica.

Firebricks.—Bricks for which the silica content is below 78%.

The British Ceramics Research Association and the Director of the National Federation of Clay Industries were consulted, and are in agreement with the classification, which corresponds with the information in 'Technical Data on Fuel.'

Diary

Sept. 6.—North British Association of Gas Managers: Annual General Meeting, Ayr. (Golf and bowling functions, Sept. 5; Excursion, Sept. 7).

Sept. 7.—Manchester and District Section, I.G.E.: Visit to Newton Chambers & Co., Ltd., Thorncliffe.

Sept. 10.—West Midlands Gas Consultative Council: Dudley Room, Queen's Hotel, Birmingham, 2.30 p.m.

Sept. 11.—London and Southern Junior Gas Association: Official Visit to the Engineering, Marine, and Welding Exhibition, Olympia.

Sept. 11-13.—Irish Gas Association: Annual General Meeting, Dublin. Business meeting, Alliance and Dublin Consumers' Gas Company's lecture theatre, D'Olier Street, 10.15 a.m. Afternoon visit at Guinness' Brewery. Annual Dinner, Royal Hibernian Hotel, 7.30 p.m. Sept. 12.—Coach visit to Greystones, 10 a.m. Sept. 13.—Golf competition.

Sept. 15.—Scottish Junior Gas Association (Western District): Visit to Dumbarton Gasworks. A. McInnes's President's Day (postponed from last session).

Sept. 17.—Eastern Gas Consultative Council: Connaught Rooms, Great Queen Street, 2 p.m.

Sept. 18-21.—Association of Public Lighting Engineers: Annual General Meeting and Conference, Brighton.

Sept. 19.—South Western Gas Consultative Council: 34, Bridge Street, Taunton, 11 a.m.

Sept. 19.—Wales and Monmouthshire Section, Institution of Gas Engineers: Autumn Meeting, Llanelly.

Sept. 20.—National Coal Board (South Western Division): Inauguration of Coke Oven Plant at Nantgarw by the Right Hon. Philip J. Noel-Baker, Minister of Fuel and Power, 3.15 p.m.

Sept. 20.—Gas Council Commercial Managers' Committee: Edinburgh, 10 a.m.

Sept. 21.—Institution of Gas Engineers (North of England Section): 'Some Aspects of Gas Manufacture Practice in the North Thames Gas Board Area', Dr. J. Burns, G.M., Chief Engineer, North Thames Gas Board. Seaburn Hotel, Sunderland.

Sept. 27.—North Thames Gas Consultative Council: Westminster City Hall, Charing Cross Road, 2.30 p.m.

Sept. 28.—Scottish Junior Gas Association (Western District): Presidential Address of J. F. Wilson. Royal Technical College, Glasgow, 5.30 p.m.

Sept. 29.—Eastern Junior Gas Association: Presidential Meeting, Cambridge.

Sept. 29-Oct. 4.—International Bakers and Confectioners Exhibition, Olympia. Gas Council Exhibit.

Oct. 5.—Institute of Fuel (South Wales Section): 'Fuel Efficiency in the Oil Industry,' M. J. Stradling. South Wales Institute of Engineers, Park Place, Cardiff, 6 p.m.

Oct. 6.—Western Junior Gas Association: Opening Meeting, Swindon. Visit to Gorse Hill Works, followed by Paper by H. Hobbs.

Oct. 6.—Yorkshire Junior Gas Association: Annual General Meeting. Address by Dr. R. S. Edwards, B.SC., A.R.C.S., Chairman, North Eastern Gas Board.

Oct. 8.—Institute of Fuel (Midland Students' Section): Chairman's Address, H. B. Bassett. The University, Edmund Street, Birmingham, 7.30 p.m.

Oct. 8.—Institute of Fuel (North Eastern Section): 'Pore-Size Analysis of Metallurgical Coke,' Dr. A. Gilchrist and Dr. A. Taylor. King's College, Newcastle-upon-Tyne, 6.30 p.m.

Preliminary notice is given of the 17th Autumn Research Meeting of the Institution of Gas Engineers, to be held at the Institution of Mechanical Engineers on November 27 and 28.

Gas and the Cigarette Making Industry

Photograph by Aero Pictorial, Ltd.

Aerial View of W. D. & H. O. Wills No. 11 Factory at Newcastle-upon-Tyne.

Recently we had the pleasure of being shown over the newly erected No. 11 Factory of Messrs. W. D. & H. O. Wills at Newcastle-upon-Tyne, and we feel that our readers will be interested in a brief story of how raw tobacco leaf is changed into the final product for cigarette manufacture, and of how large a part gas plays in the process. We are indebted to Messrs. Wills for the photographs and permission to publish this article and to the Northern Gas Board for the details concerning the gas appliances.

WORK on the great Newcastle factory was started in June, 1946, and in spite of many difficulties which were encountered in the foundation work, shortages of materials—particularly of steel and timber—and scarcity of skilled craftsmen, production on the most modern lines was commenced in March, 1950.

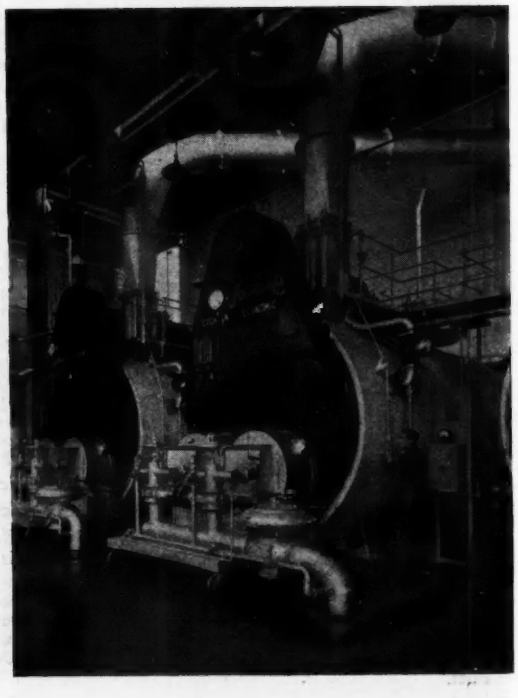
Most of us remember from school days that smoking was popularised in this country during the 16th century by Sir Walter Raleigh, and by the end of that century, tobacco smoking in pipes made of clay was a nation-wide habit. Cigarettes or 'papar cigars,' as they were then called, were the hallmark of the foreign visitor, and it was not until the Crimean war that this means of smoking was adopted by the British.

Even then the 19th century had almost passed before this form of smoking attained general popularity in this country. The preference for cigarettes has continued above all other forms of tobacco, and today they account for roughly four-fifths of the home trade in tobacco goods.

Well-Known Brands

The Newcastle factory of Messrs. Wills occupies some 27½ acres and is concerned solely with the manufacture of three well-known brands of cigarettes—Wild Woodbine, Capstan Medium, and Gold Flake. On arrival in this country, the raw tobacco leaf is deposited in a bonded warehouse, where it is normally kept for a period of two or three years under the eye of the Customs and Excise Authorities. Duty is paid on withdrawal from the Bond. After leaving the Bond, the tobacco leaf which is packed in barrels, technically called tierces, enters the factory leaf room, where the hogsheads are opened and examined.

Being in a dry and brittle state, the leaf is not fit for manufacture until it has been reconditioned. First, the different grades of leaf are blended, then passed through a chamber saturated with steam from which the leaf emerges moist and very pliable. This first treat-



The Boiler House showing two of the Cochran 'Sinuflo' boilers.

ment of the leaf is where gas plays a major part. Steam is provided by three Cochran 'Sinuflo' Economic boilers, 9 ft. 6 in. in diameter by 22 ft. 7 in. in length, each rated at 13,600 lb. per hour F. & A. 212°F. They are designed to work at a pressure of 225 lb. per sq. in. but at present operate at 150 lb. per sq. in. An individual I.D. fan is fitted to each boiler, and the gas burners are of the multi-jet radiant type supplied by British Furnaces, Ltd. Each burner has a capacity of 20,000 cu. ft. per hour. An interesting feature of the burners is that they are mounted on trolleys so that should any emergency arise they can easily removed and liquid fuel burners substituted.

Air Conditioning

In addition to leaf treatment these boilers supply the steam required for the air conditioning of the rooms engaged in processing, and also for the heating of the offices, stores, etc., together with the hot water required for domestic and kitchen requirements. Before entering the boilers the water is treated by a Permutit water softening plant and is fed to the boilers through Weir pumps.

After being reconditioned the leaf goes on to the stemming room where the stem is removed either by hand or machine, and the stemmed leaf, or lamina as it is now called, passes on to the bulk floor where the various brands are stored. On leaving the bulk floor, the lamina passes to the cutting room. It is fed into the back of the cutters and a conveyor leads it between pressure rollers where it is compressed into a compact mass or 'cake' which then passes under rotary knives. The number of cuts to the inch can be adjusted as required. The cut tobacco then proceeds by means of conveyors to the drying and cooling room.

Rotary Driers

In the drying of the tobacco, gas again plays its part. The cut leaf passes through rotary drum driers heated by a bed of Radiant Heating, Ltd., No. 4 radiant burners, each burner having a rated capacity of 1,350 cu. ft. per hour. For periods when gas pressure has to be reduced one of the driers has been adapted for low-pressure gas supply by the substitution of three rows of flat flame burners working at 20/10ths pressure. Normal drying can be done with two rows of burners, leaving the third in hand for any extra moist batch of tobacco. After drying and cooling the tobacco is stored in its various brands until required for actual cigarette making. Two of the accompanying illustrations give a general idea of the cigarette making and packing rooms.

General view of the Drying Room, showing the rotary drum driers heated by a bed of Radiant Heating, Ltd., No. 4 burners, each burner having a rated capacity of 1,350 cu.ft. per hour.

Welfare Arrangements

The works has two very fine canteen kitchens, the whole of the equipment for which was supplied by Benham & Sons, Ltd. The majority of the appliances are steam heated but the following items are gas fired: two treble oven ranges with solid hot plates; one 8-burner boiling table; one gas heated steam bain marie; and one 4-pan frying range.

The restaurants supply full meals or light refreshments as required. At the present time the staff numbers about 850. No effort has been spared to ensure that ideal working conditions prevail and every care and thought is given to the provision of recreational, social and health activities. Excellent medical and dental facilities are available for all who need treatment.

A Trades Exhibition, organised by Nottingham Chamber of Commerce, will be held from September 20 to 29, to coincide with the visit to the city of the Festival of Britain travelling exhibition. Objects of the exhibition, which will include exhibits by the East Midlands Gas Board, Stanton Ironworks Co., Ltd., and the N.C.B., are to interest commercial buyers and the general public, and to enhance the prestige of local industries. Craftsmanship in metals, etc., is being encouraged with a competition for apprentices by the Nottingham and District Trades Council.

General Views of (left) Cigarette Making Room, and (right) the Packing Room.

SHORT COURSE FOR TEACHERS OF GAS ENGINEERING AND GAS FITTING

THIS course was one of the series which has been an annual feature in the scheme of education for the industry for the last 25 years. It was held at Southampton under the general direction of Dr. P. C. L. Thorne, M.A., M.SC., H.M.I., assisted by other of H.M. Inspectors and expert lecturers.

Most of the 57 teachers were resident at Connaught Hall, where they were well cared for by the warden and bursar. They had been selected from over 90 applicants, with a preference for those who had not previously attended. Meetings were held at the Institute of Education at University College, and on the first morning of the course the teachers were welcomed by Sir Robert Wood, K.B.E., C.B., Principal of University College, and by Mr. S. E. Whitehead, O.B.E., B.SC., Deputy Chairman of the Southern Gas Board.

The main emphasis of the course was on the teaching process, since information on recent advances is now more readily available in periodical and other publications and is issued by the Institution of Gas Engineers to teachers on its register. Mr. G. M. Painter, who has recently retired from the inspectorate, gave two stimulating lectures on teaching method. Mrs. Ann Whitehead, M.A., L.R.A.M.(ELOC.), dealt with the use of the voice, and both her general lectures and consultations with groups in the evenings were much enjoyed. The thermionic products record machine, which had kindly been lent, was very useful. One afternoon was devoted to a demonstration, by some of the staff of Southampton Technical College, of experiments with simple apparatus to illustrate scientific principles. On another day, Mr. R. N. Le Fevre spoke on the use of film strips. The remainder of the time was filled in with discussion in small groups.

Visits were paid to the Pitwines gasworks of the Bournemouth undertaking, and also to the Pirelli cable works at Eastleigh, and thanks are due to these works and to the Southern Gas Board for making arrangements and supplying transport.

On the last day of the course a general discussion on syllabuses and examinations was held, at which Mr. J. H. Dyde, M.SC., President of the Institution of Gas Engineers, and Chairman of the Gas Education Committee, took the chair. The Assistant Secretary of the Instittuion, Mr. A. G. Higgins, M.SC., was also present, and the City and Guilds of London Institute was represented by Mr. S. G. Carlow and by Mr. Le Fevre and Mr. J. H. Gibbons, two of the examiners. There was an active discussion and many pertinent questions were asked by the experts.

Men Disconnecting Gas Mains should not work on their own, said the Romford (Essex) Coroner, recording a verdict of accident death on a labourer who died from gas fumes.

SPORTING ACTIVITIES IN SOUTH WALES

Members of the two cricket teams.

AT the invitation of the Llanelly gas undertaking sports club, the Swansea gas undertaking cricket and darts teams visited Llanelly on Saturday, August 11, when, in spite of rather inclement weather, a very interesting afternoon's cricket was witnessed. It was decided to limit each innings to 22 overs, and an exciting match ended with Swansea the victors by one wicket.

Following the match, tea for both teams and supporters was provided by the Llanelly gas sports club at the Halfway Hotel, Llanelly, and visitors were welcomed by Mr. A. Pickard (Engineer, Manager and Secretary of the Llanelly undertaking and President of the club). Later in the evening, the Llanelly darts team secured victory over Swansea in the third leg.

A Celebration Dinner

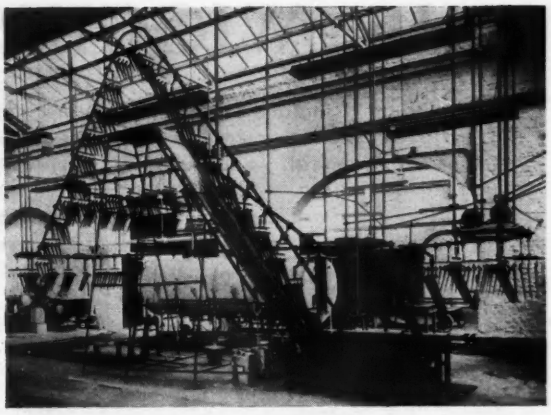
NEARLY 300 retired and present employees with more than 25 years' service with George Kent, Ltd., of Luton, visited the South Bank Exhibition and attended a celebration dinner in London on August 25. The last time such a dinner took place was in 1935, when 91 members of the firm with 25 years' service were present. The total number of serving employees with over 25 years' service is 279, and of retired members 42, with a combined total of years of service 10,853.

Mr. W. G. Ardley (left) presenting the volume containing illuminated address and signatures to Commander P. W. Kent, chairman of the firm.

At the dinner, volumes containing an illuminated address and the signatures of all long-service employees were presented to Commander P. W. Kent, chairman of the company, and Mr. W. G. Ardley, joint managing director. Mr. Ardley, with 58 years' service, is the longest-serving present member of the firm and took a great part in the company's earliest developments in large-scale water-flow measurement. Commander Kent was appointed to the board in 1919 and has been chairman since 1947, a period of great development in the company.

Commander Kent, proposing the toast of the firm, referred to the fact that in last year's trading operations total sales had passed the £3 million mark for the first time. He emphasised that the last 100 years, from the Great Exhibition of 1851 to the Festival of 1951, had proved the staying power of the firm, and paid tribute to the loyalty and family spirit of those present at this unique gathering. Quantity and quality of production were of great importance, he said, but even before these he placed the necessity for encouraging the spirit of friendliness and goodwill which had so happily marked the past.

CURING PAINT on PRESSED HINGES



General view of the plant; the dipping tank is in the foreground on the right, the radiant tunnel is in the middle distance, and the loading and unloading bay is behind the tunnel.

An Industrial Gas Development Committee report, just released for publication, on a North Thames Gas Board installation at the London Pressed Hinge Co., Ltd., Plaistow Road, E.15.

MILD steel hinges are suspended from a continuous conveyor and passed through a dipping tank, along an inclined section in which the surplus paint is allowed to drain off, and into a 12 ft. section of 3 ft. diameter G.L.C. radiant tunnel. The hinges cool while passing along a further section to the unloading and packing point.

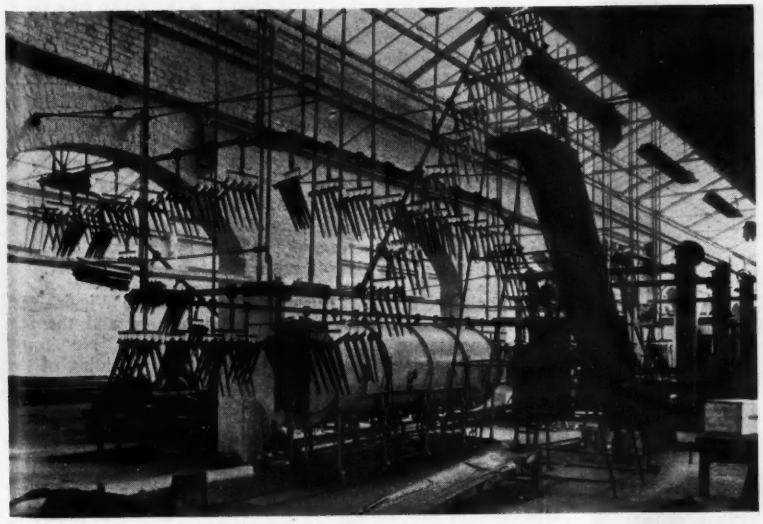
The paint is cured in a G.L.C. black emitter radiant tunnel made by Messrs. Matthew Hall & Co., Ltd., and comprises four sections each 3 ft. long and 3 ft. diameter. Each section is heated by two bar burners individually containing 18 Bray jets No. 266 size 2, the normal gas rate being 160 cu.ft. per hour at a panel temperature of 650°F. Since the tunnel is situated in an unusually lofty room, no ventilating hood is necessary.

The tunnel is equipped with an eight point Electroflo temperature indicator connected to thermocouples attached to the centre of each radiating panel. This installation is operated at 550°F., the temperature being maintained by a 1½ in. B.S.P. Bryan Donkin No. 587A governor adjusted to 2 in. W.G., and the individual sections are further controlled by setting the control cocks to give the correct pressure as indicated by a pressure gauge fitted to each burner.

The hinges are loaded on to hangers suspended from hooks spaced 18 in. apart along a Teleflex conveyor, the number of articles on each hanger depending upon their size. The work is allowed to dip into a tank containing 85 gall. of black enamel, after which it drains while ascending and descending sections inclined at 55° before entering the tunnel. After leaving the tunnel, the work has about eight minutes in which to cool before reaching the unloading point. The work is conveyed at 4 ft. per minute and since advantage of the high premises has been taken, it has been possible to instal the whole plant on a floor space of 30 ft. by 15 ft.

The output of the plant has been measured over three periods during which normal working conditions were maintained. In each case black enamel was being cured on the articles with the plant operating at a panel temperature of approximately 550°F. and a conveyor speed of 4 ft. per minute. Results are set out in the accompanying table.

Articles	Number of Articles per Hanger	Number of Articles Processed	Duration of Test min.	Approx. Gas Consumption cu. ft.	Cost per Article with Gas at 10.5d. per Therm d.
3 in., 12 S.W.G. hinge butts	20	800	15	150	0.010
"	20	1760	42	420	0.013
18 in., 14 S.W.G. hinges	5	250	18	180	0.038



Another view of the installation showing the entrance to the radiant heating tunnel and the extra length of conveyor used for cooling the hinges after passing through the tunnel.

New Coal Cleaning Plant

MAGNETITE PROCESS

The National Coal Board recently installed a new plant which will automatically clean coal and separate it from the shale with which it is mixed. The heart of the system is a large washing tank full of water in which is a thick suspension of ground magnetite. The resulting sludge is a liquid of just such a density that the coal will float on it while the heavier shale will sink.

Coal from the pit is fed down a conveyor belt into the washing tank, the real coal floats on the surface and is directed towards an overflow at one side where it is taken off by another conveyor, but the shale sinks to the bottom and is removed continuously. The water and the magnetite are recovered automatically and circulated round again and again.

This one system is sufficient to treat half-a-million tons of coal a year in lumps up to 6 in. in size.

THE WIGGINS GASHOLDER

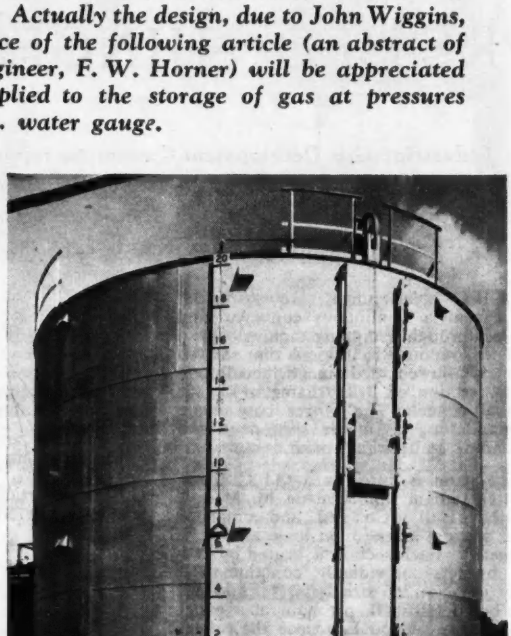
A type of gasholder new to this country but proved in the United States is to be manufactured under licence by Ashmore, Benson, Pease, & Co. in collaboration with the General American Transportation Corporation. Actually the design, due to John Wiggins, dates back more than 15 years. The significance of the following article (an abstract of a paper by the Corporation's Chief Design Engineer, F. W. Horner) will be appreciated at once. The original principle has been applied to the storage of gas at pressures ranging up to 20 in. water gauge.

THE principle of the Wiggins holder is that of the use of synthetic rubber coated fabric as the seal, instead of water, or tar, or grease. In the early stages the Wiggins holder operated at low pressure. The application for storage at higher pressures (up to 20 in. W.G.) has met with acceptance. Today, installations ranging up to 500,000 cu.ft. are being used and holders up to 7 mill. cu.ft. capacity are now being considered by the gas industry.

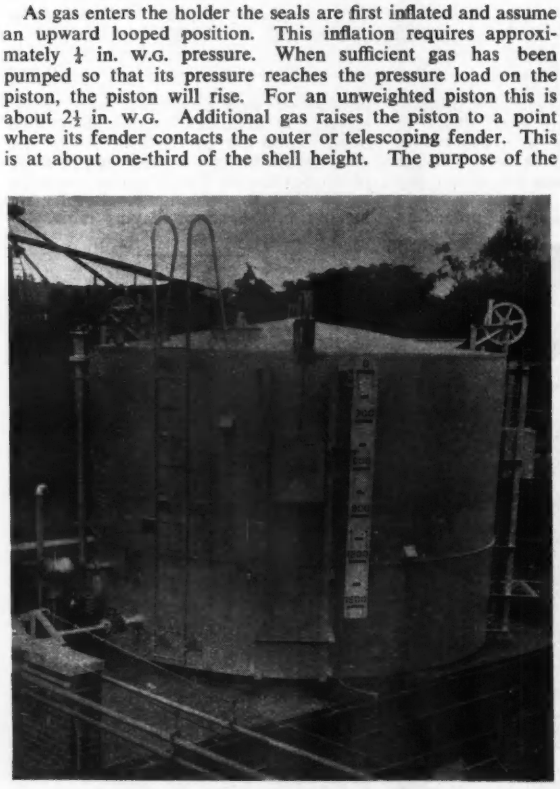
The Wiggins holder is essentially a piston displacement type holder as opposed to the bell or lift type water gasholder. The seal medium used to prevent escape of gas through the annular space between piston and shell is a flexible impermeable synthetic rubber coated fabric. Fig. 1 illustrates the essential operating parts of the Wiggins holder.

The seals are fabric cylinders whose edges are joined by gas-tight closures to the piston telescoping fender and the shell wall. The piston is weighted with concrete blocks to meet the designed operating pressure. When the gasholder is in the empty position the piston rests on the shell bottom. The volume confined within the loops of the seal represents less than 0.5% of the storage capacity and presents conditions for rapid, thorough purging.

As gas enters the holder the seals are first inflated and assume an upward looped position. This inflation requires approximately ¼ in. W.G. pressure. When sufficient gas has been pumped so that its pressure reaches the pressure load on the piston, the piston will rise. For an unweighted piston this is about 2½ in. W.G. Additional gas raises the piston to a point where its fender contacts the outer or telescoping fender. This is at about one-third of the shell height. The purpose of the fenders is to form an abutment surface for the seal fabric. As the piston rises, the seal rolls off the piston fender on to the telescoping fender. This movement of the seal is entirely frictionless, there is no rubbing or abrasion. The same is true of the seal connecting the telescoping fender and shell wall. When the piston fender contacts the telescoping fender, both elements rise as a single unit until full storage capacity is reached. Operation of the piston and telescoping fender is illustrated in Fig. 2. Over the complete cycle from empty to full, the pressure variation may be ¼ in. to 1¼ in. of water. This slight pressure increase is produced by the extra load put on the piston at the time it raises the telescoping fender.



Holder storing nitrogen. Capacity 20,000 cu.ft.



Roof top Holder. Capacity 1,500 cu.ft.

Simplicity of design is the characteristic of the Wiggins gasholder. Close tolerances have been eliminated and the few moving parts are always open for inspection. No roller guides or centering mechanisms are required. Guiding of the piston is automatically accomplished by the seal which maintains the piston centred within the holder shell and prevents the piston from rotating. This is a supplementary function of the fabric seal which utilises the resistance of the fabric loop to shear along its circumferential axis. The effect of this resistance has been measured by exerting both lateral and tangential thrusts against the piston while operating the piston vertically. These tests showed insignificant displacement and confirmed the fact that there was more than ample resistance in the seal itself to resist deflection by such loads.

A stabilising mechanism is required to maintain the piston in a level position and to resist unbalanced vertical forces. This is accomplished by applying uplifting forces from an external levelling weight at diametrically opposite points near the piston periphery. Fig. 1A illustrates the mechanism used.

A steel weight that travels vertically on guides on the outside of the holder shell is attached by cables to two diametrically opposite points on the piston. Any eccentric load on the piston is countered by an increased lift component of the levelling weight being carried in the cable near the load. At least two weight systems are used on a holder so that the piston is balanced in all quadrants. This type of balancer system operates completely independently of the seal and the relative position of the tank wall. It is a system that can be designed with a minimum amount of friction and can be economically installed with generous allowances for long life.

The telescoping fender is an annular framework with an external and an internal abutment surface. The purpose of this element is to utilise the maximum volume of the surrounding shell. The telescoping fender reduces the non-usable storage space of the shell. With this design, six-sevenths of the total volume is available for gas storage. The operation of the Wiggins holder with a telescoping fender and an inner and outer seal is illustrated in Fig. 2.

The seal fabric in general use for most Wiggins holders today consists of a core of asbestos cloth impregnated and coated with a neoprene rubber coating. The asbestos cloth used is so designed to give the strength required with a weave that will permit the coating to key through the cloth and give maximum peel strength. Neoprene coating is used because of its excellent resistance to ageing, permeability, and chemical reaction.

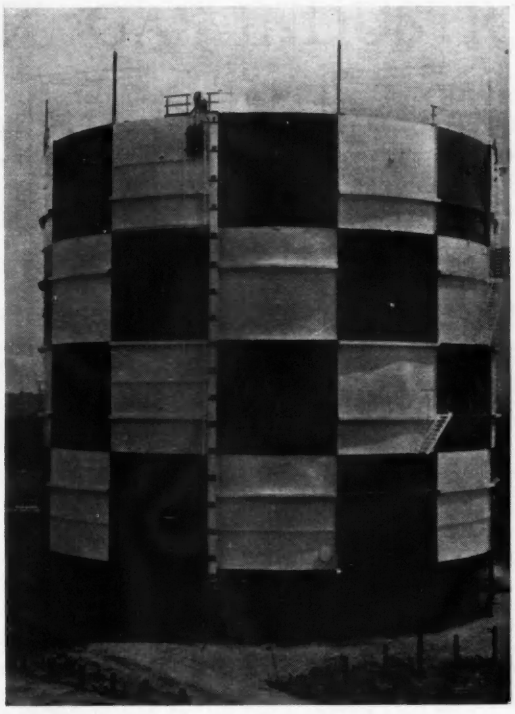
Design features which promote low maintenance and assure uninterrupted operation under most stringent conditions are:—

(1) Weather has no effect on the operation of the holder. The necessity for cold weather protection against freezing seals is eliminated and with it the cost of heating or treating the sealing medium.

(2) Mechanically, the gasholder is simplified by the elimination of close tolerances. The gaps between the moving and stationary parts of the holder are sufficient to withstand even shell deformation due to uneven foundation settling. Inspection can be reduced to once per year.

(3) Routine servicing has been eliminated by providing the balancing system with self-lubricating bearings and non-corrosive parts.

(4) Gas composition is unchanged in the holder and dry gases can be stored. It is also possible to store gases that form corrosive compounds with water without the corrosion problem or gas loss that occurs in water seal holders. Carbon dioxide is an example.



Holder storing hydrogen. Capacity 500,000 cu.ft. Normal operating pressure 6 in.

(5) Safety of operation and insurance against gas loss are added features provided by the fabric seal. Referring to Figs. 1 and 2 it can be seen that the amount of gastight shell required for the holder is ¼ to ½ of the shell height. The shell above the seal connection to the shell serves only as an abutment surface for the seal and a weather housing. The upper shell and roof of the gasholder is completely ventilated. The space above the piston has constant air change. This is a safety factor against any explosive or toxic mixture being formed above the piston.

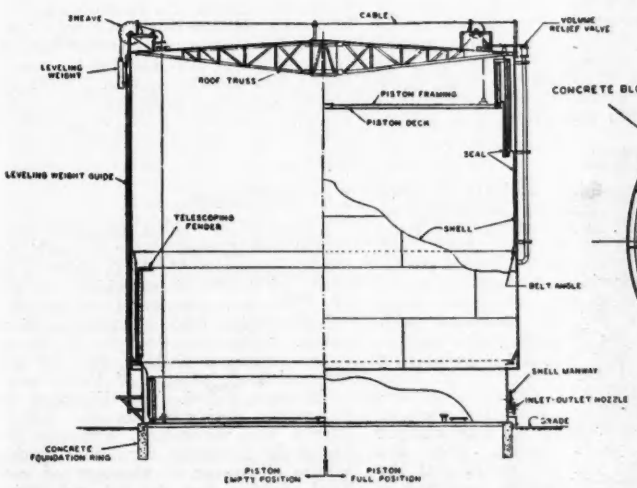


Fig. 1

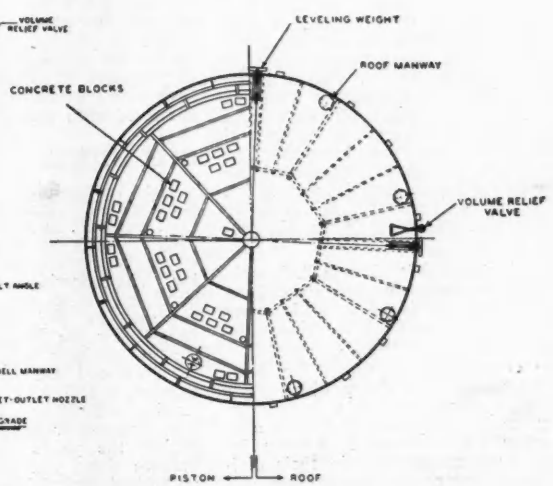


Fig. 1A.

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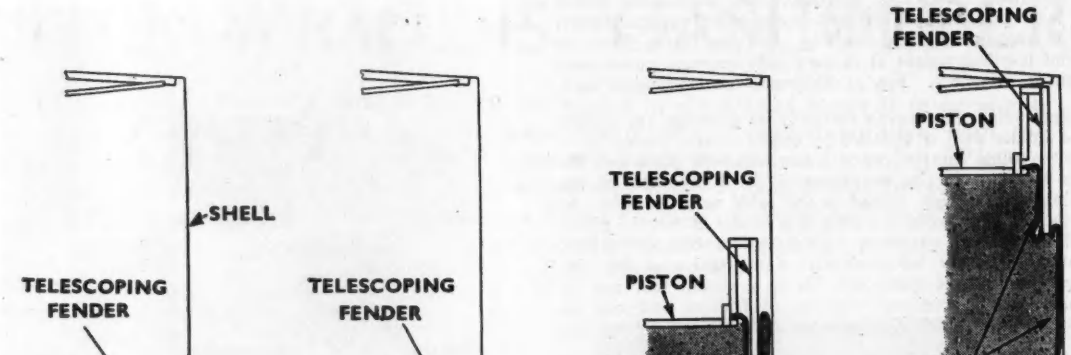


Fig. 2

Referring again to Figs. 1 and 2 it can be seen that all the surfaces and connections that must be gastight are exposed to gas pressure when the piston is at the bottom of the holder. Therefore, with only enough gas to raise the piston a short distance, it is possible to test the holder accurately for leaks by means of a standing leak test. The difficulty of compensating for daily temperature variations is eliminated because such a small volume of gas is involved. Even slight leakage can be determined by such a test and remedied.

Access to the top side of the piston of the holder is a simple matter since the upper part of the shell is not gastight. Above the seal connection to the shell there are access doors spaced along the stairway. When the holder is in service it is only necessary to go up to the level of the piston (or the seal connection if the piston is in the lower half of the shell), to gain access to the piston. This convenience eliminates the necessity for some of the costly accessories that other gasholders have required.

(6) Operating pressure can be designed up to 20 in. W.G.

(7) Foundation requirements are reduced.

COMPANY NEWS

MUREX

The directors of Murex announce that the total value of the consolidated sales for 1950-51 was £9,730,000 compared with £6,820,000. The greater part of the increase of £2,910,000 was due to higher selling prices necessitated by increased costs of raw materials, although there was a satisfactory increase in the physical volume of the company's business. The shortage of raw materials affected the company's ability to meet demands in full and it became necessary to revert to rationing and allocation for certain products.

The chairman, Mr. George P. Joseph, comments on the modest increase of 2½% in the ordinary dividend, which becomes 12½% compared with 10% which had been maintained since 1937.

The Government proposals for statutory limitation of ordinary dividends is regarded by Mr. Joseph as a grave injustice to those companies who have conformed with the Government's wishes by having been conservative in their dividend distributions in recent years and who are now being penalised more heavily than those who have not done so. It will mean that the ordinary shareholders at any rate for the next three years will be limited to a maximum dividend of 11¼% per annum. The chairman adds that if the Government's proposals are carried through it is intended to place in future to a special reserve the difference between what will be permitted by statute and what would have been paid had the Government not interfered with their freedom of action.

CELLACTITE

The twenty-third ordinary general meeting of Cellactite and British Uralite, Ltd., was held on August 28 at the company's works at Higham, Kent, Mr. George V. Parker (the chairman) presiding. The following is an extract from his circulated statement: The net profit amounts to £45,399, compared with £40,512 for the previous year. "During the year we have bought a large building in Gravesend and have removed from London, and Higham, our entire administrative and selling staffs. The costs of this change-over have all been charged against the year's trading. From the balance sheet you will notice that the authorised capital has been increased to £250,000 and effect has been given to the issue of 450,000 bonus shares of 2s. each.

Our deliveries for last year were the highest in the company's history. Contributing to this increase was considerable improvement in sales of Urastone flues and ducting and Kimolo insulating bricks and hollow partition blocks. Our moulded Urastone in its great variety of form, from the neat gas flue to massive hoods and ducting sets of almost unlimited function, is to be seen all over the country. No effort will be spared to maintain our supremacy in this particular trade.

LAUNCESTON

Accounts of the Launceston (Tasmania) Gas Company for the half-year ended December 31, 1950, show a net profit of £1,480, from which the sum of £200 was transferred to the staff superannuation fund. Payment of an interim dividend at the rate of 5% per annum required £1,250. For the corresponding six months of 1949 the net profit was £1,254. The Directors reported that during the period a full gas supply was maintained, although this forced the Company, for a short period, to use oil owing to shortage of coal. Toal revenue was £48,864, as against £46,043 for the six months ended December 31, 1949.

SULPHUR FROM THE GAS INDUSTRY

By
Dr. J. G. KING

In a contribution to the technical section of 'The Times Review of Industry' for August, Dr. J. G. King (Director, Gas Research Board) discussed the possibility of the recovery from town gas of sulphur of sufficiently high purity to allow of its use in the contact process of sulphuric acid manufacture. We publish below an extract from this contribution.

THE serious character of the supply problem which now faces British industry through the reduction of exports of Texas sulphur from the United States has directed attention to the substantial contribution which is made by the gas industry to the sulphur required for the manufacture of sulphuric acid. It has also raised the question of whether this contribution can be increased either in quantity, or in quality, or both. A high proportion (about 70%) of the sulphur consumed in this country is converted into sulphuric acid. It is to this requirement only that the carbonising industries have so far contributed, but means are now forecast which suggest that they could, by some re-arrangement of plant and by the introduction of one new process, provide sulphur pure enough for other purposes.

Before the war the main source of sulphur was pyrites, imported chiefly from Spain, but this material has been gradually displaced by American native sulphur, in spite of its higher cost, since the capital cost of sulphur-burning plant is only about 30% of that of a pyrites-burning plant and the overall cost of acid production is about 66%. The reason for the higher capital cost of plant burning pyrites is the greater complexity of the burner required and the need for careful purification of the gases before they reach the catalyst. The expansion of the sulphuric acid industry has, therefore, not only been mainly in the direction of sulphur-burning plants but sulphur has also displaced pyrites to a great extent. Had the supply of sulphur remained unlimited, the amount of sulphuric acid made from it would probably have exceeded 400,000 tons a year in 1952. Table I compares the quantities of the raw materials used in 1938 and in 1947.

Table I

COMPARISON OF PRE- AND POST-WAR SOURCES OF SULPHUR

Origin	1938 Tons	1947 Tons	Percentage of Total Sulphur Consumed 1947
Elementary sulphur ...	75,000	219,000	45
Pyrites	280,000	191,000	21
Zinc concs.	142,000	163,000	10
Spent oxide	145,000	180,000	18
Anhydrite	116,000	155,000	6

The increase of 25% contributed by spent oxide during this period is attributable to the increased output of town gas; this increase will continue at the rate of about 5% per annum if, as is probable at present, the expansion of the gas industry is maintained at its existing rate. The question now at issue is whether the sulphur from the gas industry should continue to be made available in the form of spent oxide or whether some change of technique could make it available as sulphur of sufficiently high purity, thereby allowing the acid industry to utilise it for the more efficient contact plants or for other purposes. Recent developments in the gas industry have, indeed, shown how this conversion might be effected.

Spent oxide may be extracted with organic solvents such as carbon disulphide or toluene and the sulphur recovered by crystallisation. Only one firm in Britain operates this process and the main reason why there has been no expansion has been that the sulphur recovered may contain as much as 2% of condensed tar or organic polymers which make it unsuitable for the contact process. In addition, the extraction process has been integrated with the recovery of ferric ferrocyanide, which has limited its application to that of the demand for this chemical. It is true that this impure sulphur can be purified, but the only process so far applied industrially has involved treatment with oleum, which is too expensive to be interesting in the United Kingdom. There has now emerged, question of the cost of extraction of sulphur by means of solvents within the limits set by economics, since the oxide would be re-cycled, the purchase of new oxide greatly reduced, and the sale value of the sulphur improved by a lower cost of transport and a high unit market value. One unit of sulphur as the pure element is now worth 2s. 6d. (May 1, 1951), while one unit as spent oxide is worth only 1s. 2d., and the cost of the unit of pyrites is 1s. 10d.

Ferrocyanide Extraction

It cannot be postulated, however, that the spent oxide can be re-cycled indefinitely, since crude coal gas contains hydrocyanic acid and this compound is removed, along with the hydrogen sulphide, by the iron oxide and slowly accumulates in the form of ferric ferrocyanide. The extraction of the ferrocyanide could, however, be undertaken at less frequent intervals by the established process of treatment of the oxide with alkali, and its commercial value would cover the cost. It is calculated that extraction of ferrocyanides would be necessary every third or fourth time the oxide is re-cycled. At this stage it would be necessary to add Fe_2O_3 to replace the iron extracted and to adjust the *p*H value of the material.

In order to achieve this result it would be necessary to undertake an extensive re-arrangement of plant in the gas industry, and the best method would undoubtedly be to integrate the re-arrangement with the re-modelling of works and construction of new plant which are going on all the time. Where new works are being contemplated, however, or increase of capacity of purifying plant, it would be wiser if possible to introduce, in place of the present box method of using iron oxide, a flow system which would allow easier control of the essential working conditions, reduce operating costs, and occupy less ground space.

The first move in the improvement of oxide handling was the development of the 'tower' purifier in which the drawback of the boxes in requiring so much space was overcome by arranging a series of trays in vertical towers; the trays were handled mechanically for charging and discharging. The Wandsworth Gas Company was a pioneer in installing this type however, from the work of the Gas Research Board, a comparatively simple process which involves only the addition of a cheap reagent to the sulphur solution, the precipitation of the tar in a granular form and its removal by filtration. Both the reagent and the process of filtration are cheap and the resulting sulphur may then have a purity exceeding 99.8%, which would be suitable for burning in a modern contact acid plant. This method is now available for application should it prove to be an economic proposal to extract spent oxide by means of solvents.

The Gas Research Board considered this question and in the course of work on the general problem of gas purification its chemists have established conditions which not only yield pure sulphur but also enhance the reactivity of the extracted oxide for its original purpose of purification. These conditions are: (i) the arrangement of the other gas purification plant in advance of the oxide boxes in such a manner that the gas is either washed with oil for the recovery of benzole, or, alternatively, washed with a lower proportion of oil to remove naphthalene and then further purified by passage through an electrostatic precipitator, which removes residual tar fog; (ii) the maintenance of the oxide within certain limits of moisture-content and under conditions of temperature-control which avoid overheating. The spent oxide produced under such conditions may actually possess after extraction a higher reactivity than the original oxide. Oxides originally of high activity are still further improved in this respect, while materials of low activity are, by continued treatment, enhanced in quality to the level of the best oxides. These conclusions bring the

of plant and has obtained highly satisfactory results. The tower system is not, however, a true flow system and two technical methods of achieving this end have now been proposed: in the first the oxide moves slowly downwards in a tall vertical cylinder and its movement is controlled by a special extractor at the bottom. The gas moves vertically upwards through the descending stream. In the second the oxide forms a turbulent or fluidised bed. The velocity of the gas is then controlled within the limits necessary for fluidisation without excessive entrainment of fines.

The first method has reached the development stage at one pilot plant which is capable of treating one million cu.ft. of gas a day in a tower of 8 ft. 6 in. diameter by 20 ft. high, with about 12 tons of oxide in the system. In order to maintain the necessary stability of moisture-content and temperature with continued oxidation of sulphuretted hydrogen to elementary sulphur, the oxide is recirculated continuously at a rate which corresponds approximately to an increase of sulphur of 1% during each passage through the tower. A special grate ensures regular withdrawal of the oxide and the bed is so maintained that no sulphuretted hydrogen can slip through by channelling. The necessary oxidation of the iron sulphide to iron oxide and sulphur is achieved in the conveyor which carries the material back to the top of the tower. Early results with this pilot plant are most promising and only minor technical problems remain to be solved before it will be possible to construct new plant using this technique.

A Great Advance

This improvement in handling oxide is a great advance, the ground space required is reduced to one-tenth, labour charges are extremely low, and chemical control should be easy, but it is not yet a complete process. It would seem to be necessary to complete the picture by adding a sulphur-extraction technique to the cycle of operations, which would make available pure sulphur for sale and return the extracted oxide to the system. It has already been established by experiment that spent oxide from the pilot plant will give a highly reactive oxide on extraction with a solvent, but it still remains to devise a suitable extraction process and establish that the economics of its operation are sound.

The alternative process of handling iron oxide has not progressed beyond the laboratory, but it has been established that the technique is applicable to the absorption of hydrogen sulphide from coal gas with essentially the same results as with the moving-bed purifier, but at rates of gas flow probably several times higher a unit area of ground space. In a possible process it is visualised that granular oxide would be fluidised in the stream of unpurified gas in two stages and under conditions in which temperature would be controlled by means of cooling coils and humidity by saturation of the gas. It is still necessary, of course, to conduct experiments on a larger scale to solve any development problems which might emerge. Tests would be required to determine the correct choice of iron oxide and perhaps even the necessity for the production of a specially granulated material, the optimum conditions of rate of flow, and precautions against 'slip' of hydrogen sulphide.

Desulphurisation

Either of these alternatives could be employed for the purification of town gas, but a complete picture would not be presented unless plant for the desulphurisation of the spent oxide on the site were added to the process. This addition would ensure re-cycling of the reactive oxide and the sale of elementary sulphur only. The plant might cover extraction by solvents as already described, or by volatilisation of the sulphur in an inert gas at a temperature of, say, 300°C. The second proposal has been advanced by the inventor of the moving-bed purifier, but the necessary development work on the process has not yet been carried out.

The calculation of the probable economics of a complete process must depend largely on the cost of solvent extraction or volatilisation, but it is clear that important factors on the credit side will be the certainty of obtaining the maximum price; the product for sale will be sulphur, and there will also be reduced charges for its transport in comparison with spent oxide, together with the return of the reactive oxide and its probable re-use a number of times. What this figure would be would have to be determined by trial, but it is already clear that it would not be less than three or four times and it might well rise to an indefinite number of times if ferric ferrocyanide were also extracted. From the national point of view a further advantage would be that imports of foreign iron oxide would be greatly reduced although shipments come mainly from Holland and not from dollar areas.

The carbonising industries include, of course, the manufacture of metallurgical coke as well as of town's gas; approximately equal quantities of coal, 22-24 mill. tons a year, are consumed in each branch. The gas industry recovers all the sulphur volatilised during the carbonisation of coal with the exception of the small fraction (3% of the volatilised sulphur) which persists in the form of organic compounds of sulphur. Of the gas manufactured in the production of metallurgical coke, however, only that proportion (20%) sold to the gas industry is fully purified; the remainder, which is utilised for metallurgical process work and for the heating of the ovens, is not treated, and this now valuable sulphur is not recovered. Table II gives the approximate data for 1947.

Table II

DISTRIBUTION OF TOTAL OUTPUT OF COKE OVEN GAS IN 1947

	(in million cu.ft.)
Total gas made	265,000
Gas purified	55,000
Gas used for heating ovens	127,000
Gas used in metallugical processes ...	77,000
Not accounted for	6,000

From the gas purified the equivalent of 16,000 tons of sulphur was obtained, but a further 64,000 tons were not recovered. Even if purification plant were installed only in the largest works a substantial proportion of this 64,000 tons could be recovered. There are in Great Britain some 20 works with volumes of unpurified gas averaging 5,000 mill. cu.ft. a year and 22 works averaging 2,400 mill. cu.ft. If purification plant were installed in these 42 works only, the recovery of sulphur could be over 45,000 tons a year.

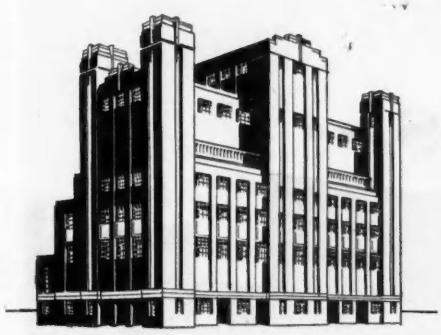
The Main Demands

The main demands for sulphuric acid in Britain are for the manufacture of fertilisers (32%), ammonium sulphate (17%), artificial silk (9%), metal-pickling (6%) and other uses, each less than 5% (36%). The carbonising industries use sulphuric acid for the fixation of the ammonia in gas liquor as ammonium sulphate. The amount required is about 200,000 tons a year, of which the gas industry uses about 60,000 tons and the coke oven industry about 140,000 tons. If this amount of acid, representing 67,000 tons of sulphur, or part of it, could be saved by fixing the ammonia in a different way, great advantages would ensue. Since the ammonium sulphate is used as a fertiliser the first consideration should be to explore the possible direct use of liquor for the same purpose. This objective could be attained by concentration of the liquor, which contains from 1% to 2% of ammonia, to a strength of about 25%, its subsequent purification to the required degree, and finally its direct application on the land. This programme is obviously a matter for collaborative work with the Ministry of Agriculture. An alternative would be to transport the concentrated liquor to strategic points and convert it to ammonium sulphate on the spot by chemical action with ground natural calcium sulphate (anhydrite or gypsum) and carbon dioxide. Consideration of costs indicates that it would be more economical, in the national interest, to provide the sulphuric acid necessary for ammonia fixation by the direct conversion of anhydrite in a locality where adequate supplies are available and the by-products can be efficiently utilised.

Sir Hubert Houldsworth, K.C., the new chairman of the National Coal Board, speaking at the opening of the Board's Summer School at Oxford on August 27, said:

We are full of anxiety as to the immediate position. So far this year the saleable output of deep-mined coal has increased by over 3,950,000 tons, and the output of opencast saleable coal has *decreased* by about 1,180,000 tons. Thus, the net increase in saleable output is only 2,774,000 tons. At the same time inland consumption of coal has increased by nearly 5 mill. tons. There is our problem. Until we have bridged the gap, and also provided much more coal for export, we have not performed our first task of producing sufficient coal to meet the nation's requirements.

The recent trend in manpower is most disturbing. Manpower is again below 700,000. Recruitment must be stimulated, wastage must be diminished. The deployment of manpower should be examined at regular and frequent intervals at every pit.



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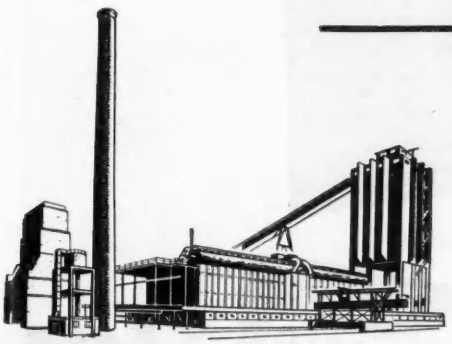

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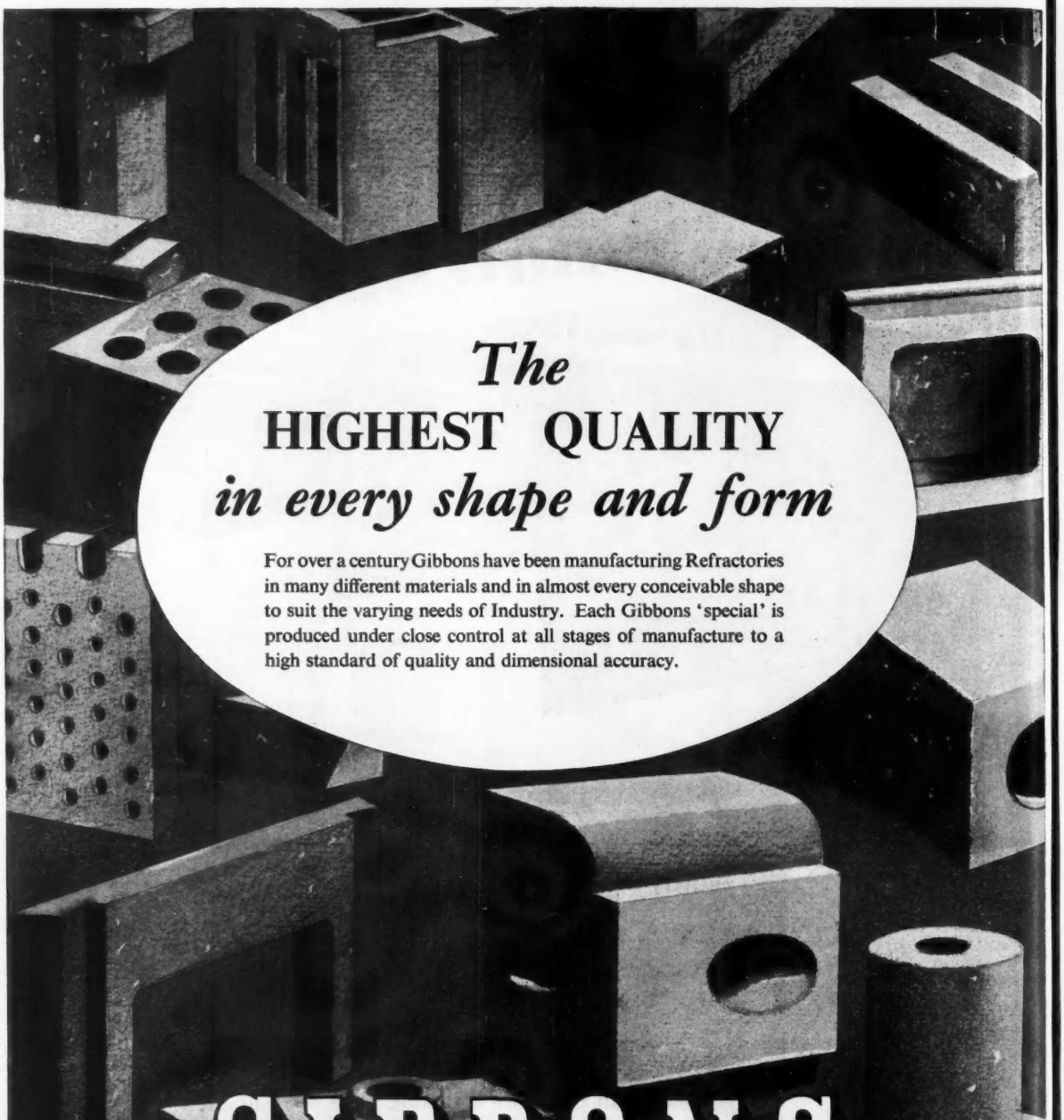
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The Use of AUTOMATIC REGULATORS in Gasworks

by W. GRAHAM

A Northern Junior Gas Association paper submitted by the British Junior Gas Associations' Joint Council to the Institution of Gas Engineers.

THE application of automatic control in the gas industry where the maintenance of correct pressure, vacuum, flow, temperature, steam, level, and other physical conditions are of importance has now developed to the extent that renders it unnecessary to prove the case for automatic regulators. The problem is rather that of selecting the best automatic regulator for the purpose under consideration, and, therefore, the object of this paper is to describe the design and construction of a modern relay type of regulator found on modern gasworks. The basic feature of this regulator is a relay which when operated by a suitable impulse or metering system measuring the pressure, flow, temperature, etc., to be regulated converts the small force available from the impulse system into a powerful correcting force, sufficient to operate the heaviest control organs. The relay should work without any appreciable inertia, so that its response to the slightest variation from normal will provide a correction proportional to the variation; such a relay must also be practically frictionless.

The action of the regulator that I propose to describe is based on the principle that if a free jet of fluid, issuing under pressure from a nozzle, impinges on a surface at right-angles to the direction of flow, the whole of its forward velocity and momentum is destroyed. This results in a pressure being set up on the surface equal to an area of the cross-section of the fluid jet. If an orifice were placed on the surface, with an area equal to that of the jet, and if a pressure gauge were connected to this orifice, it would be found that the pressure on the latter would show the same as the pump supplying the nozzle, less an amount lost in pipe friction between the pump and nozzle. To apply this principle, the jet pipe moves in a horizontal plane facing a hardened steel distributor. In this distributor and immediately adjacent to each other are two orifices, also on a horizontal plane. These orifices are of the same diameter as the bore of the nozzle jet pipe. The orifices are connected by means of suitable piping to the opposing ends of the control cylinder.

When the jet pipe is in the mid position the oil strikes equally on the two orifices. The pressure difference on the control cylinder is zero, and there is no tendency for the piston to move. If the jet pipe is deflected from the mid position, say to the left, the oil jet will cover the left orifice more than the right, the pressure in the left-hand oil pipe is greater than in the right, and the control piston will move. Stops are so arranged that the jet pipe travel is restricted, and the greatest possible deflection, in either direction, is just to cover fully the appropriate orifice. From this it can easily be seen that the greatest deflection in either direction is equal to only half the diameter of the bore of the nozzle. The nozzles are made in two sizes, 2.5 mm. and 1.7 mm. bore; this approximately equals 1/10 in. and 1/16 in. dia., and the force required to move the jet pipe is equal to only a fraction of one-thousandth part of a pound. From this it can be seen that the effects of inertia are almost negligible. The magnitude ratio between the impulse and the correcting force can be best explained by the following example.

If an impulse of only a fraction of one thousandth part of a pound moves the jet pipe, and jet pipe pressure is 75 lb. per sq. in., a difference of 60 lb. per sq. in. is easily obtained at the control cylinder. With a cylinder whose piston is 3 in. dia., a correcting force of 420 lb. per sq. in. is obtainable. It is also evident with this relay system, which is virtually frictionless and inertialess, that the correcting force is proportional to the variation. This relay system is also most reliable as it has only one moving part and this protected by oil from wear and corrosion. To prevent air being entrained in the oil jet, and forced into the control cylinder, a shroud is fitted on the face of the distributor. This is provided with an oil-release aperture so that the shroud runs continually full of oil.

Types of Regulator

Types of regulators may conveniently be considered under the following headings:—

Constant Pressure Regulators.—The standard constant pressure regulator shown diagrammatically in Fig. 1 is used

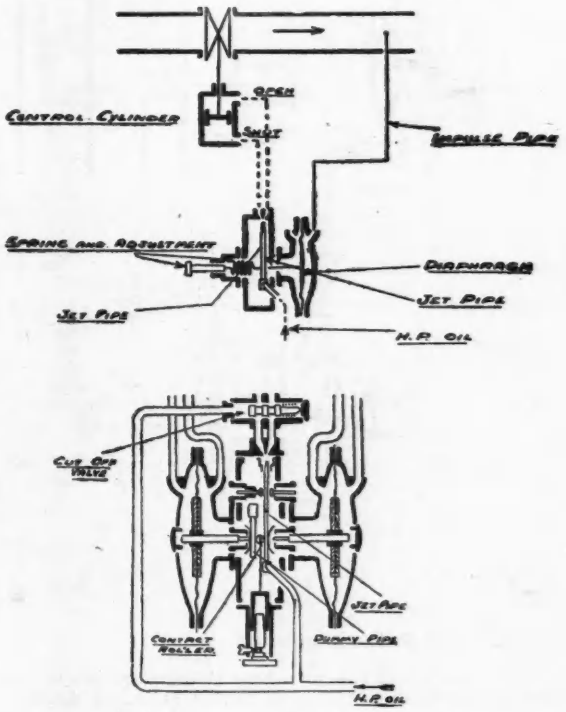

FIG. 1.

for low pressures—*i.e.*, zero to about 1 lb. per sq. in. The arrangement of such a regulator is as a pressure reducing control. The diaphragm on the impulse system is of leather, augmented by aluminium stiffening plates. The push rod is attached to the centre of this diaphragm through a suitable gland and is in contact with the jet pipe. The force on the push rod is balanced by a spring, one end of which is attached

to the jet pipe, while the other end is located on a plunger, which can move axially by means of a screw arrangement. The impulse pressure connections are to the outside of the diaphragm and the spring is adjusted until the whole is in equilibrium—*i.e.*, jet pipe is in mid position.

If the pressure in the main increases, the impulse through the medium of the diaphragm and push rod moves the jet pipe to the left-hand side. The oil pressure on the left-hand side pipe is increased and the valve in the main closes so as to reduce the pressure. As the pressure falls to normal value the jet pipe returns to the mid position, and the system is again in balance. Should the pressure fall, the jet pipe would move to the right until the spring force was correspondingly reduced. The oil pressure would be greater in the right-hand side pipe and the valve would open to the correct pressure. In the case of vacuum mains, this same arrangement is in vogue, the only difference being that the impulse connections are on the opposite side—*i.e.*, the inside of the diaphragm. In many cases, the regulator may have to maintain constant the difference of two pressures. In this case, the pressure difference is set up by an orifice plate, and transmitted by two impulse pipes, one on either side of the diaphragm.

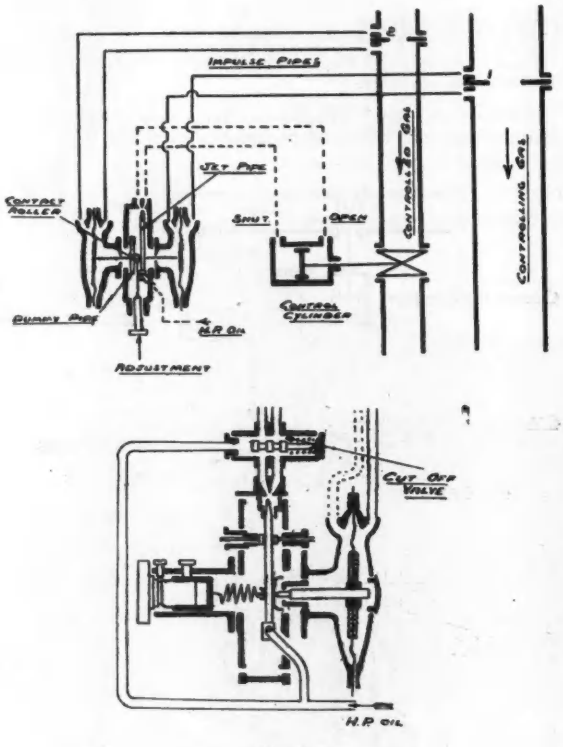

FIG. 2.

Mixture and Ratio Regulators

In the case where two gases have to be mixed in constant proportions, the layout may be similar as shown diagrammatically in Fig. 2. The two gases, each in its respective main, are (*a*) primary or controlling gas, and (*b*) secondary or controlled gas. The gas flows are measured by the orifice plates 1 and 2, which set up in each case a differential pressure that is proportional to the square of the gas volume and gas density. The gas densities normally remain more or less constant, so that the differential pressure varies only with flow. This type of regulator is fitted with two diaphragms, one acting as the adjustment to the other. The diaphragm on the left operates a dummy jet pipe known as the counter pipe, and between this and the jet pipe proper is a contact roller secured to a flexible steel blade. When the contact roller is in the mid position, the jet pipe is also in the mid position, and the regulator is in equilibrium when the two forces on the two respective push rods are equal. It now follows that the differential pressure must be equal if the diaphragms are both of the same size.

Should the primary flow increase, due to lowered resistance in the gas main, the differential pressure would also increase and the jet pipe would move to the left. The oil pressure would increase in the left-hand pipe, and the control cylinder would open the butterfly valve in the secondary gas main, thereby increasing the flow until the differential pressure on the

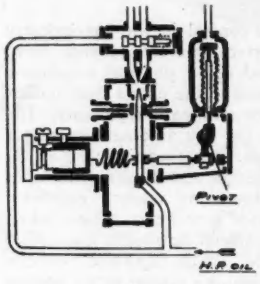

FIG. 3.

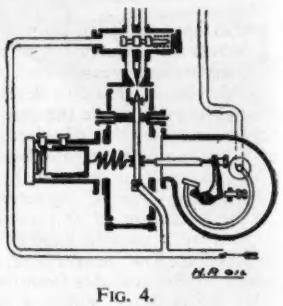

FIG. 4.

left-hand diaphragm equalled the differential pressure on the right-hand diaphragm. The jet-pipe would then be in the mid position. Should the gas flow increase in the secondary gas main, the jet pipe would move to the right, closing the butterfly valve until equality is again restored. Adjustments to this regulator are by means of a plunger and screw arrangement. The steel blade that supports the contact roller is attached to this plunger, and the screw attachment can either advance the contact roller towards the distributor plate, or withdraw the same away from the distributor plate. If the adjustment is towards the distributor, the force exerted by the right-hand push rod is decreased. In other words, it is simply taking moments of a force about a given point. It also follows that, if the contact roller is advanced towards the distributor, a smaller differential is required on the secondary diaphragm to keep the regulator balanced, or it can be said that the ratio of secondary to primary flow is decreased. Furthermore, if the contact roller is moved away from the distributor, and away from the mid position, a larger secondary differential pressure is required to balance a given primary flow, or the ratio of secondary to primary flow is increased. The adjustment on this type of regulator enables the left-hand push rod to be varied from three times to one-third the right-hand force.

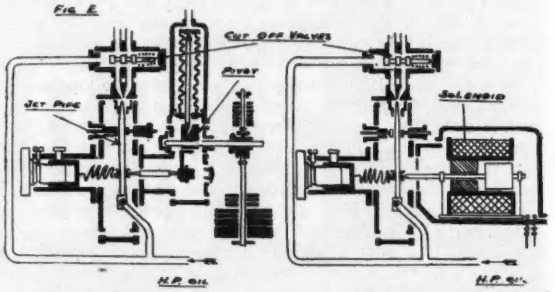

FIG. 5.

FIG. 6.

So far, low pressure systems only have been considered, and, as can be fully realised, the impulse system must be varied to deal with high pressures, etc.

The regulator shown as Fig. 3 operates on pressures from ½ to 50 lb. per sq. in. It consists of a flexible metallic bellows

operating the push rod through the medium of a knife edge pivot.

The regulator shown as Fig. 4 operates on pressures from 10 lb. per sq. in. to several thousand lb. per sq. in. It works on the bourdon tube principle and can also be used on high vacuum.

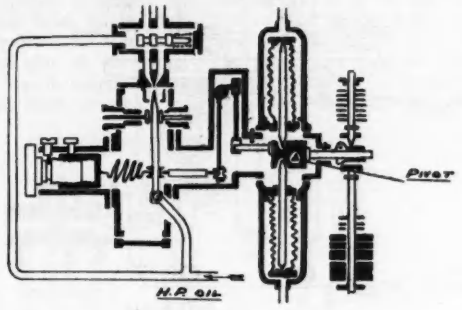

FIG. 7.

The pressure range of the regulator shown as Fig. 5 is from 10 to 1,500 lb. per sq. in. It consists of a large metal bellows, the force being almost balanced by counterweights. This system is used where great accuracy and sensitiveness are required.

In the type of regulator shown as Fig. 6 the impulse system is by means of an electric current operating a solenoid; this in turn operates the push rod. This arrangement is extensively used for gasholder level control.

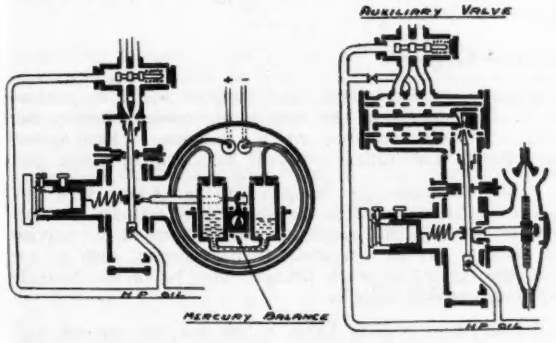

FIG. 8.

The impulse system shown as Fig. 7 consists of two opposed bellows with counterweights. It is used for differential pressures higher than those that can be dealt with on the mercury balance. An application of this impulse system is as a feed water differential pressure regulator.

The impulse system shown as Fig. 8 consists of a mercury balance, comprising two vessels connected by flexible tubes and mounted on a weigh-bar pivoted on a knife-edge fulcrum. A difference in pressure will cause the mercury to be displaced from one vessel to the other, such action bringing about movement on the pushrod. This type of regulator is used for maintaining constant liquid levels in boilers, and is also employed as a high pressure gas regulator.

The impulse system shown as Fig. 9 is for maintaining constant temperatures up to about 900°F. It consists of a mercury-in-steel thermometer, this being connected by a small-bore capillary tube to a special bourdon tube that operates the jet pipe. Variation in temperature expands or contracts the mercury so that the bourbon tube tends to uncoil or coil, operating the push rod accordingly.

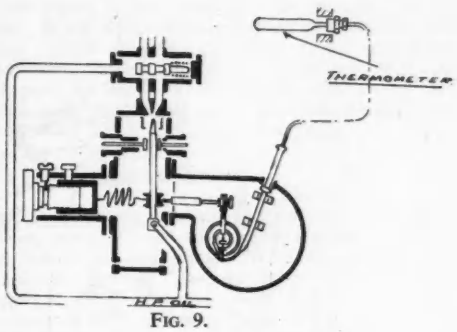

FIG. 9.

Overtaking Gear

In some cases, there is a fairly long time lag between the control valve movement and the response of the controlled line fluid, this causes the regulator to hunt, and the only cure is to reduce the speed of operation. This is done by incorporating a device known as the overtaking gear.

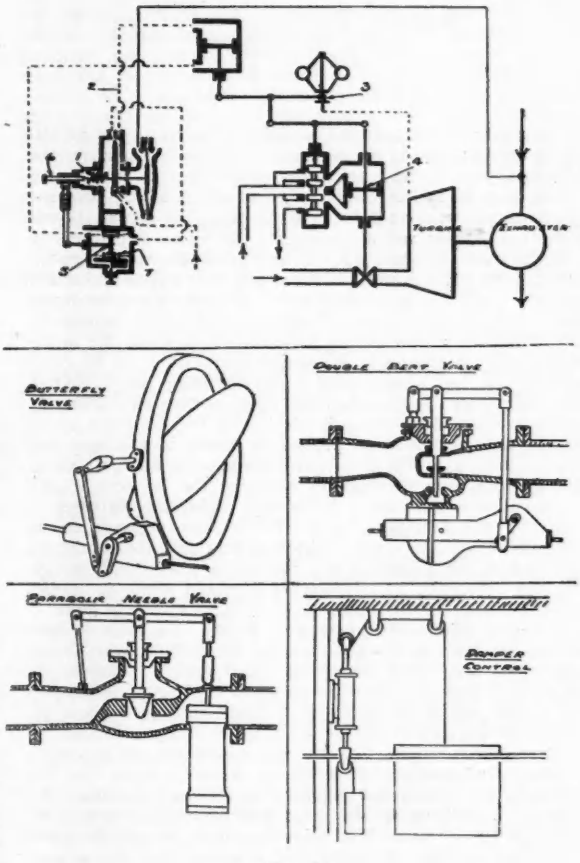

FIG. 10.

Fig. 10 is a diagrammatic layout of a turbo-driven gas exhauster, similar to that found on town gas retort installations. In this case, it is necessary to vary the capacity of the exhauster to suit the volume of gas being produced by the retorts. In many cases the exhausters are steam driven, by either rotary or reciprocating engines, and the exhauster gas capacity is controlled by varying the speed. The maintenance of exhauster vacuum suggests equality between the

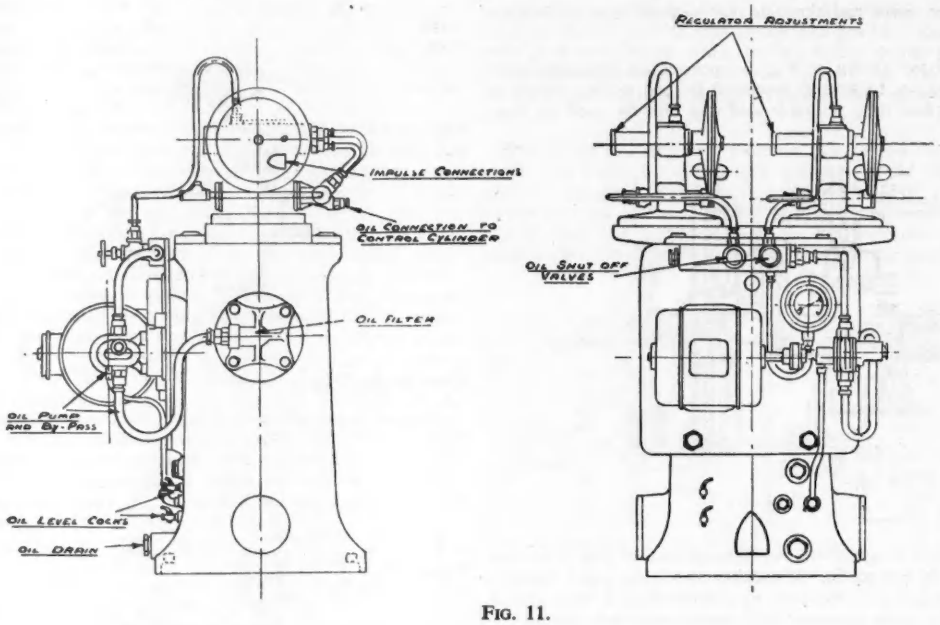

FIG. 11.

gas make and the exhauster capacity. Therefore, the regulator is so arranged as to maintain a certain vacuum on the inlet side of the exhauster. Assuming that a vacuum of 15 in. W.G. is to be maintained, but owing to an increased gas make the vacuum falls to 10 in. W.G., the spring (1) will move the jet pipe and diaphragm to the right. High-pressure oil will travel through pipe (2) and move the control piston downwards. The centrifugal speed governor comes into action only to limit the maximum speed, so point (3) is normally fixed and would act as a fulcrum to the link movement. Therefore, the action of this movement is to move the distributor valve downwards, allowing high-pressure oil to enter cylinder (4) and consequently open the steam valve. When the steam valve has reached the position that will ultimately allow a steam flow that will deal with the increased make of gas, the vacuum in all probability would be still low, and over-regulation would occur, with consequent hunting, unless the opening were arrested by returning the jet pipe to the mid-position. This action is brought about by the employment of the overtaking gear. When high pressure oil in pipe (2) moves the control piston downwards, the return oil also moves the piston in the overtaking gear (5). Through this link movement the plunger (6) is moved outwards, reducing the tension in the spring and so returning the jet pipe to the mid position. The operation of the regulator is now suspended, but readjustment has to be made to the spring and diaphragm. The overtaking gear piston (5) has to be in the mid position to return the correct relationship between the spring and diaphragm. This action is brought about by means of the spring and washer (7), this being permitted by the use of the bypass (7). The speed in which the piston (5) returns is adjustable, but it should be so arranged that by the time this piston has returned to the mid position, the exhauster will have altered speed and the vacuum should be back to 15 in. W.G. The overtaking gear is usually fitted to regulators (Fig. 11) controlling a system that has a persistent tendency to hunt. Hunting is due to a time lag between the movement of the control valve and the variation of the controlled line fluid, such lag tending to cause the regulator to over correct. Regulators usually have overtaking gear fitted when controlling the following:—

Temperature Regulators.—In this case, apart from the delay in the heat capacity affecting the temperature of the surrounding medium, there is also a lag in the expansion of the mercury on the impulse system.

Large Storage Capacity.—Examples are systems incorporating gasholders, storage tanks, high pressure receivers, etc.

Inertia Effects.—Examples are systems controlling exhausters, turbines, pumps, etc., where a constant pressure, flow, etc., is required.

Control Organs

Butterfly Valves.—These are suitable for low pressure work. The door does not seat in the closed position, but there is a radial clearance, which, of course, is kept as low as possible. Lubrication is usually by means of grease gun.

Dampers.—Waste gas dampers of the sliding type are usually counterbalanced so that the control cylinder has only to overcome frictional resistance. In this method the heaviest of dampers can be operated. Other dampers, such as are used for controlling stack draught, may be of the butterfly type with vertical spindle.

Double Beat Valve.—These valves are for use on high pressure gas, air, liquid, and steam. The stoppers are of the same diameter, but do not seat in the closed position, there being a small radial clearance. These valves are not fluid-tight, but this is not of importance.

Parabolic Needle Valve.—These valves are used for pipe sizes below 3 in., and where pressures are not excessive. The regulator may, of course, operate any desired type of control organ, which could include (*a*) lubricated plug valves, (*b*) brush shifting gear on electric motors, and (*c*) fan dampers and vane control, etc. In all cases it is important that the control organ shall be of the correct size. If the valve be too big, it will operate when less than half open, consequently on light loads the valve would be very slightly open, giving cause for the regulator to hunt.

Auxiliary Valve

In cases where the regulator operates large control cylinders, as in the case of damper control, the oil flow from the normal jet pipe may be insufficient to meet the demand. The auxiliary valve is just a type of distributing valve controlling the oil flow direct from the pump. The jet pipe operates the auxiliary valve, so that if the jet pipe goes to the left the auxiliary valve goes to the left, and *vice versa*. When

this valve moves, high pressure oil direct from the pump is forced into the control cylinder, thus giving the required movement.

Oil Pumping Plant

The oil pump is of a positive gear type fitted with a suitable bypass that can be adjusted so that the pump gives the required pressure. The driving motor is of the totally enclosed type, either D.C. shunt wound or of A.C. squirrel cage type. The motors are rated at 0.5 to 1.0 H.P., depending on the size of the pump. The pump can also be operated by a small reaction turbine, and duplicate pumping plant can be fitted, in which case there may be two motor driven

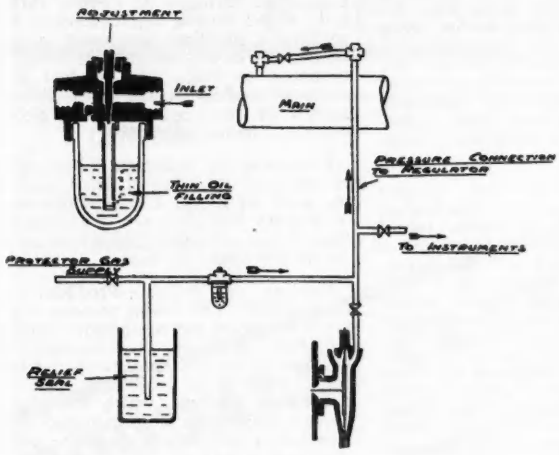

FIG. 12.

pumps, two turbine driven pumps, or one of each. Particular attention should be paid to the oil in use, for unsuitable oil will cause untold trouble, due to varying viscosity with atmospheric conditions, and in winter it may lead to very sluggish operation.

An oil cut-out valve is fitted where it is necessary to isolate the control cylinder from the regulator. It consists of a spring-loaded piston valve normally held open by the high pressure oil. If for some reason the high pressure oil ceases to flow—*e.g.*, power failure, etc.—the spring immediately comes into action, moves the piston valve and seals both of the oil pipes to the control cylinder. Oil cannot leave this cylinder, and the control organ is hydraulically locked in the position in which it was last working.

Impulse Connections

It is important that all connections should be made off the top of mains carrying wet and tarry gases, and if possible this piping should be arranged so that there is a fall back to the main. If, however, it is impossible to do this, and the regulator is below the main, then suitable drain cocks should be inserted to trap the moisture. It is also advisable to use cross-pieces instead of bends, thus making the pipework accessible for cleaning. If the regulator is operating on dirty, corrosive, or moisture-laden gas, then it is important that this gas shall not come in contact with the diaphragm. A protector hood (Fig. 12) is therefore incorporated in the impulse system, it consists of a liquid seal through which a small quantity of clean gas is passed, giving a visible indication of its flow. This gas acts as a constantly renewed clean gas buffer, preventing the dirty gas from coming in contact with the diaphragm, yet at the same time transmitting any pressure changes to the regulator. Air is the most suitable protector gas and should be under pressure just slightly above the gas pressure of the main. If high pressure air is used, a relief seal must be employed in case of anything being overlooked and this high-pressure air coming in contact with the diaphragm. If this were to happen the diaphragm would be destroyed on account of its being sensitive only to low pressures. Oil or water may be used in the glass bowl of the protector hood, but oil is preferred on account of its immunity from freezing and evaporation.

In conclusion, it may be stated that automatic regulators, well maintained and working properly, will increase the efficiency and output of the gas industry.

In these times, gasworks are a primary and integral part of the nation's commercial and industrial economy; therefore, to increase their efficiency, no matter how little, is to increase industrial efficiency.

Scrap Prices Increased

THE controlled maximum prices of iron and steel scrap are increased from to-day under an Order (Iron and Steel Scrap (No. 4) Order, 1951), made by the Minister of Supply.

The increase is £2 per ton except for compressed destructor scrap and two lower grades of unprepared process scrap. For these three grades the increase is 30s. per ton. Apart from small increases to meet transport costs, delivered scrap prices have been stable since 1937, in the main not exceeding £5 a ton.

Purpose of the higher prices is to stimulate the collection of ferrous scrap. This is an urgent need in view of the decline in the supplies of imported scrap and the great importance of increasing steel production, states the Ministry.

A small part of the increase is needed to defray increased costs of collection, processing and handling, particularly in the case of the smaller merchants and in the more remote areas.

Subject to this, the Scrap Merchants Federation has given an assurance that the increase will be passed on to the owners of scrap so as to encourage them to return as much as possible. The scrap merchants have also assured the Minister that the rise in scrap prices will secure a substantial increase in the recovery of scrap.

The Iron and Steel Corporation of Great Britain and the British Iron and Steel Federation support the price increase. The new Order is regarded as fixing the maximum prices of ferrous scrap for some years ahead.

With the exception of two special grades of iron, the controlled prices of finished iron and steel are not being increased to consuming industries, but some adjustments are necessary, within the steel industry itself, in the prices of semi-finished steel. The Minister has made an Order accordingly (Iron and Steel Prices (No. 3) Order 1951) also taking effect to-day.

The increases covered by this Order are:

Cylinder and refined iron, 25s. per ton; cold blast pig iron, 15s. per ton. Semi-finished steel: Billets, 5s. per ton; sheet and tinplate bars, 7s. 6d. per ton; forging ingots, 25s. per ton.

WEIGHTS OF SPECIAL CASTINGS

The British Standards Institution has published Addendum No. 1 to B.S. 78—dealing with cast-iron pipes (vertically cast) for water gas and sewage. This addendum sets out the weights of special castings dealt with in that standard which was last revised in 1938. Copies of the Addendum (P.D. 1166) are obtainable from the Institution, 28, Victoria Street, London, S.W.1, price 3s. post free.

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TRADE NEWS

George Kent Training Courses

As the complexity of industrial instruments increases, the necessity of providing users with an adequate explanation of the theory and practice of instrumentation becomes more apparent. George Kent, Ltd., of Luton, have for many years made a practice of giving an extremely thorough training to individuals sent to the works by user firms. Kent's have now begun a series of integrated courses for instrument mechanics and engineers from customers, to give this training on a more centralised basis.

The courses last for four or five weeks, depending on the requirements of the trainees, during which period whole-time instruction is given by a qualified training staff on the theory, operation and maintenance of a wide range of Kent instruments and control apparatus. A workshop and lecture room have been specially provided.

First results have been most encouraging, and there is now a greater demand for places on the courses than can be satisfied in the immediate future. Firms wishing to send trainees on these courses should address their enquiries to the Training Officer, Luton.

Lancashire Dynamo

Three leaflets have recently been produced by L. D. Group Publicity, on behalf of subsidiary companies and are as follows:—

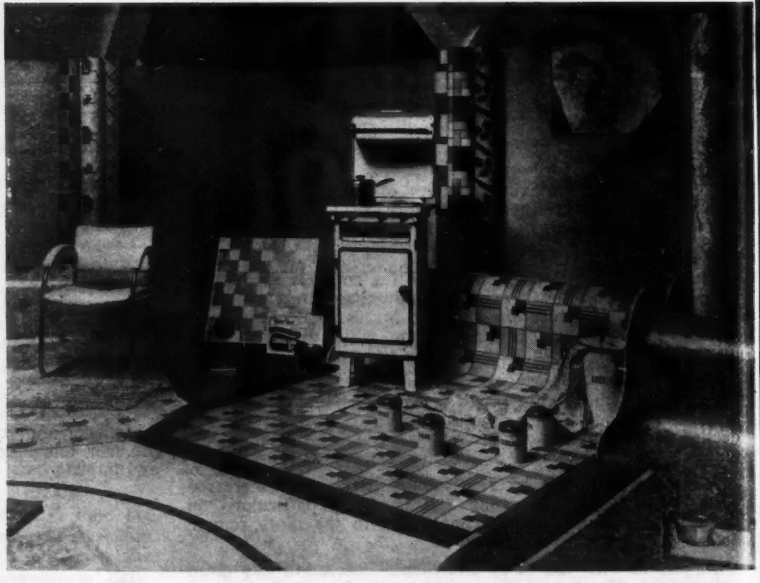
The Symbol of Power in Industry (Machine Tool Drives).—This leaflet of Lancashire Dynamo & Crypto (Mfg.), Ltd., shows various applications of that company's electrical equipment in relation to the driving of machine tools. It is hoped to make this the first of a series of leaflets dealing with different aspects of the application of electric motors to industrial needs.

Electronics in Industry.—This reprint of an article describes in detail some of the work of British Electronic Products of Rugeley, and gives also a general picture of that company's specialised activities in the electronic field.

Festival of Britain.—Produced for Crypto, Ltd. This leaflet presents a pictorial review of the equipments supplied by that company, to furnish the kitchens of various restaurants and bars at the South Bank Exhibition. The layout of the kitchens, which was also a Crypto responsibility, is indicated by a selection of diagrams shown in the leaflet.

L. D. Group Publicity, 25, Shaftesbury Avenue, London, W.1.

R. & A. Main



This attractive showroom display was recently arranged by a leading Scottish floor cloth and linoleum manufacturer in collaboration with R. & A. Main, Ltd., Falkirk, featuring a Main No. 527 Deluxe cooker. The display aroused considerable interest locally and many visitors from overseas have seen this cooker in the display, which shows how well a solus display in an appropriate but unusual setting will command attention. The enquiries received for the Main No. 527 Deluxe have been referred to gas undertakings throughout Great Britain, Northern Ireland, and Eire.

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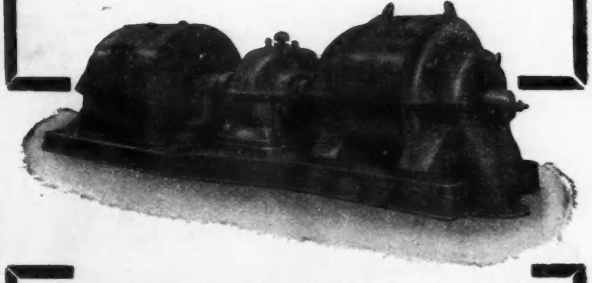

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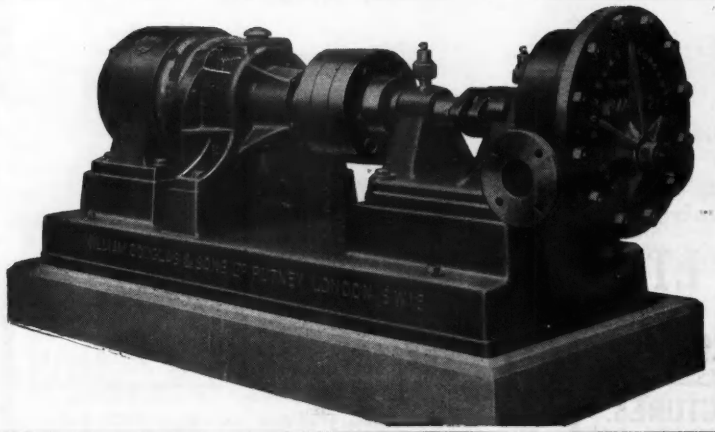
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WATFORD DIVISION.

INDUSTRIAL GAS ENGINEER.

APPLICATIONS are invited for the position of INDUSTRIAL GAS ENGINEER for the Northern Section of the Watford Division. Applicants should have had considerable experience in the design, construction and installation of industrial and commercial plant covering a range of widely representative industries, and should be suitably qualified by examination.

The salary scale will be within the range, Grade IX A.P.T. ('Fringe' Metropolitan) £590-£690 per annum, according to experience. The successful candidate would be required to pass a medical examination.

Applications stating age and giving full particulars of education, training, qualifications and experience, should be sent not later than September 24 to the General Manager, Eastern Gas Board, Watford Division, Radiant House, Clarendon Road, Watford, Herts.

EASTERN GAS BOARD

CAMBRIDGE DIVISION.

JUNIOR TECHNICAL ASSISTANT.

APPLICATIONS are invited for the appointment of a JUNIOR TECHNICAL ASSISTANT at the Peterborough District of the Board. Candidates should hold the I.G.E. Ordinary Grade Certificate in Gas Engineering (Manufacture), and practical experience in the technical control of continuous vertical retorts, carburetted water gas plant, and the associate ancillary plant will be an advantage. Candidates should be free of National Service commitments. Salary will be within A.P.T. Grade II of the National Salary Scales for the Gas Industry.

Applications giving details of qualifications and experience, and supported by the names of two referees, should be made to the undersigned within fourteen days of the appearance of this advertisement.

F. A. RHEAD,
Group Engineer and Manager.

No. 3 (Peterborough) Group,
Cambridge Division,
Eastern Gas Board.

THE GAS COUNCIL

ACCOUNTANCY ASSISTANT.

THE GAS COUNCIL invite applications from qualified accountants for the appointment of ACCOUNTANCY ASSISTANT in the salary range £725 per annum rising by annual increments of £25 to £850 per annum. The commencing salary within the range will be dependent on the qualifications and experience of the successful candidate.

The appointment will be subject to such superannuation regulations as the Council may, in due course, adopt and the successful candidate will be required to pass a medical examination.

Applications giving full details of age, qualifications and experience should reach the Secretary, The Gas Council, 1, Grosvenor Place, London, S.W.1, not later than fourteen days from the appearance of this advertisement.

NORTHERN GAS BOARD

STOCKTON DIVISION.

TECHNICAL ASSISTANT (MANUFACTURE).

APPLICATIONS are invited for the above appointment at the Stockton Unit.

The salary attached to the post will be related to the qualifications and experience of applicants.

Applications, giving details as to salary required, age, training, qualifications and experience, together with the names of two referees, should be forwarded not later than September 20, to Mr. G. W. Perks, Engineer and Manager, Gas Works, Thompson Street, Stockton-on-Tees.

F. L. SCAIFE.
Divisional General Manager.

Gas Works,
Thompson Street,
Stockton-on-Tees.

NORTHERN GAS BOARD

SUNDERLAND DIVISION.

APPLICATIONS are invited for the following positions :—

SENIOR CHEMIST :

Applicants for this appointment, which carries Divisional Status must be suitably qualified and be capable of taking over the supervision of Chemical Testing throughout the Division.

Practical experience of Gas Works or Coke Oven Plant operation, is essential.

The salary to be subject to negotiation and will be commensurate with responsibilities of the position and the qualifications of the candidate.

WORKS CHEMIST—SUNDERLAND UNIT :

Applicants for this appointment should be conversant with routine chemical testing and with experience of Gas Works or Coke Oven Plant operation.

Salary—A.P.T. Grade IV, minimum £380 per annum, commencing at a figure commensurate with qualifications and experience.

The successful candidates will be required to pass a medical examination and the appointments will be subject to the provisions of such Superannuation Scheme as may be adopted by the Board.

Applications stating age, experience and qualifications giving names of two referees, should be addressed to the undersigned within fourteen days of the issue of this advertisement.

W. O. KIRKWOOD,
Divisional General Manager.

Fawcett Street,
Sunderland.
August 27, 1951.

(*Classified advertisements continued on Supplement 4*)

APPOINTMENTS VACANT (ctd.)

ROBERT DEMPSTER & SONS LTD., Elland, Yorks., have a vacancy for a SENIOR DRAUGHTSMAN for proposal and contract work, preferably with experience in Gasholders and Purification Plant. Permanent and progressive post. Pension Scheme.

ASSISTANT INSPECTOR 30/40 years of age with draughting experience required by an old established Engineering firm in the West Riding of Yorkshire. Inspection chiefly of cast iron and fabricated vessels. Applicants must have served an apprenticeship and have had many years of practical floor experience, preferably with a firm manufacturing gas and chemical plant or with a Gas Undertaking. Superannuation scheme. State age, experience and salary required, to No. 9971, *Gas Journal*, 11, Bolt Court, Fleet Street, London, E.C.4.

SCOTTISH GAS BOARD

PERTH GROUP.

PERTH DISTRICT.

WORKS TECHNICAL ASSISTANT.

APPLICATIONS are invited for the post of WORKS TECHNICAL ASSISTANT at Friarton Gas Works, Perth. Candidates should possess the Institution of Gas Engineers Higher Grade Certificate (Manufacture) and preference will be given to those having experience of Continuous Vertical Retorts and C.W.G. Plants.

The salary will be according to experience and qualifications, the maximum being Grade VI of the National Salary Scales (£455 to £535 per annum).

The terms and conditions will be those agreed by the National Joint Council for Gas Staffs. The successful applicant will be required to pass a medical examination and to subscribe to any superannuation scheme that the Board may subsequently adopt.

Applications stating age, personal details, particulars of education, training, qualifications and experience should be submitted to the undersigned not later than September 12, 1951.

W. NICOL BAIRD,
Group Manager.

Gas Works,
Friarton,
Perth.

NORTH WESTERN GAS BOARD

BLACKBURN GROUP.

WORKS FOREMAN—

GREENBANK WORKS, BLACKBURN.

APPLICATIONS are invited for the above position.

The successful applicant will be required to supervise all yard labour in connection with coal, coke and by-products handling, oxide purification, and the usual Gasworks processes, but not including retort house labour.

The commencing salary will be within Grade A.P.T. VI of the National Salary Scales (£455-£535 per annum), according to experience and qualifications.

The successful applicant may be required to pass a medical examination and to subscribe to such scheme of superannuation as the Board may adopt.

Applications, suitably endorsed, giving personal details, particulars of training, qualifications and experience, together with the names and addresses of two referees, should reach the Group General Manager, North Western Gas Board (Blackburn Group), Cardwell Place, Blackburn, not later than twelve days after the publication of this advertisement.

NORTH WESTERN GAS BOARD

NORTH CHESHIRE GROUP.

DISTRICT SERVICE MANAGER—

NORTH CHESHIRE AND GLOSSOP UNDERTAKINGS.

APPLICATIONS are invited from suitably experienced and qualified persons for the position of DISTRICT SERVICE MANAGER of the North Cheshire and Glossop Undertakings at a salary of £825 per annum.

The person appointed will be responsible for all aspects of consumer service within the districts named, including the organisation of gas installation and maintenance staffs, the control of showrooms and general administrative co-ordination.

The successful applicant may be required to pass a medical examination and to subscribe to such scheme of superannuation as the Board may adopt.

Applications appropriately endorsed giving personal details and full particulars of training, qualifications, and experience, together with the names and addresses of two referees, should be addressed to the General Manager, North Western Gas Board (North Cheshire Group), Gasworks, Portwood, Stockport, within fourteen days of the publication of this advertisement.

DRAUGHTSMEN for Gas Works and Coal Tar Product Plant. Five-day week, Canteen facilities, Permanent position at A.E.S.D. London Rates for experienced men. Pension Scheme. Apply: The Chemical Engineering & Wilton's Patent Furnace Co. Ltd., Holbrook Park, Horsham, Sussex.

PLANT ENGINEER with knowledge of chemistry as applied to fuel combustion, required on plant manufacturing carbon black. Salary £800 per annum. Successful applicant will be required to pass medical examination. Candidates holding suitable qualifications should apply to the Works Manager, Philblack Limited, Avonmouth Dock Estate, Avonmouth, within fourteen days of the appearance of this advertisement.

SOUTHERN GAS BOARD

PORTSMOUTH, GOSPORT & BOGNOR REGIS GAS UNDERTAKING.

CHEMIST.

APPLICATIONS are invited for the position of CHEMIST on the Laboratory Staff of the above Undertaking.

Applicants must have considerable experience of modern Gas Works Plant and processes, and of the normal chemical control of a large Gas Works. Experience Coal Testing Plant will be an advantage.

The commencing salary will be within Grade VIII of the National Salary Scales, *i.e.*, £540-£620 per annum, according to experience and qualifications.

The successful candidate will be called upon to pass a medical examination and to subscribe to such scheme of superannuation as the Board may decide to adopt.

Applications stating age, experience and qualifications, giving the names of two referees, should be received by the undersigned by October 1, 1951.

H. M. LAWRENCE,
General Manager.

Gas Offices,
The Square,
Portsmouth.
August 21, 1951.

AGENCY

LONDON AGENT, with long established personal connection with Gas Engineers in London and Southern Counties, seeks further representation. At present operating on behalf of one only very old established firm. Advertiser has established office at excellent West End address and also offers complete facilities and advantages of London office if desired. Any flexible arrangement considered at very modest terms. Apply No. 9972, *Gas Journal*, 11, Bolt Court, Fleet Street, London. E.C.4.

PLANT FOR SALE

PHONE 98 STAINES

FOR SALE: "Cochran" BOILER—17 ft. × 7 ft. 6in. diam., 100 lbs. w.p.
"Mitchell" SLAT CONVEYOR—80 ft. long × 30 in. wide.
"Paxman" LOCO TYPE BOILER, 7,000 lbs. evap., 100 w.p.
R.S. Cyl. ENC. TANKS—34 ft. × 5ft 6in., 26ft. × 7 ft., 30 ft. × 7 ft. 6in., and 25 ft. × 5 ft. 6 in.
"B. & W." COMPRESSOR, 3 cyl., 400 c.f. p.m., 100 lbs. w.p.
HARRY H. GARDAM & CO. LTD.

O. E. T. CRANES
FOR IMMEDIATE DELIVERY

FOR SALE: Two-ton Capacity O.E.T. CRANES by "Morris." Span 31ft. 6in. Motorised all motions for 400/3/50 supply. Fitted magnetic brakes. Cab or floor control. Span could be altered to customers specification.

COX & DANKS LTD.,
Frederick Rd., Salford, 6.
Wadsley Bridge, Sheffield, 6.
Scapa House, Park Royal Rd., N.W.10.
Oldbury, Langley Green, Birmingham.

BUFFALO INJECTORS

Class C

Please send for particulars

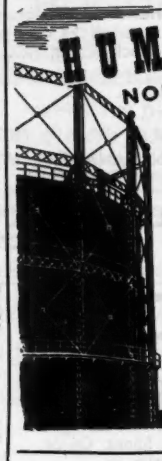
GREEN & BOULDING, Ltd.
162a Dalston Lane, London, E.8

REPAIRS

FOR PUBLIC LIGHTING
CLOCK CONTROLLER REPAIRS.
(A.I.D. approved)

BRIGHT, SON & CO.
(CLERKENWELL) LTD.
SUTTON WORKS, ARLINGTON AVENUE, ISLINGTON, N.1
Canonbury 2049 Brifulson, Nordo, London.

HUMIDINE
NON-SETTING PAINT



Used by the leading Gas Companies for the protection of lower plates and cuppings of Gasholders. The most efficient anti-corrosion paint in existence. HUMIDINE never cracks, never dries and is absolutely impervious to water. OXYGRAFITE GASWORKS PAINT is also manufactured by . . .

ASPINALLS
(PAINTS) LIMITED
CARLETON - SKIPTON : YORKS
TELEPHONES: SKIPTON 548/9

n.d.h.

THE "FLUXITE QUINS" AT WORK

"FLUXITE makes plumbing a joy"
Now turn on the main tap, old boy.
By golly, what force!
Good plumbing, of course. . .
Good gracious! Our greenhouse" yelled Ol.

For all SOLDERING work—you need FLUXITE—the paste flux—with which even dirty metals are soldered and "tinned." It does not "poison" the solder nor corrode the metal—and can be used with safety even on sensitive apparatus.

With Fluxite, joints can be "wiped" successfully that are *Impossible* by *any other method.*

FLUXITE has been used for over 40 years in Government Works and by the leading Engineers and Manufacturers. OF ALL IRONMONGERS—in tins—From 1/- upwards.

The FLUXITE GUN puts FLUXITE where you want it by a simple pressure. Price 2s. 6d. or filled 3s. 6d.

ALL MECHANICS *WILL* HAVE

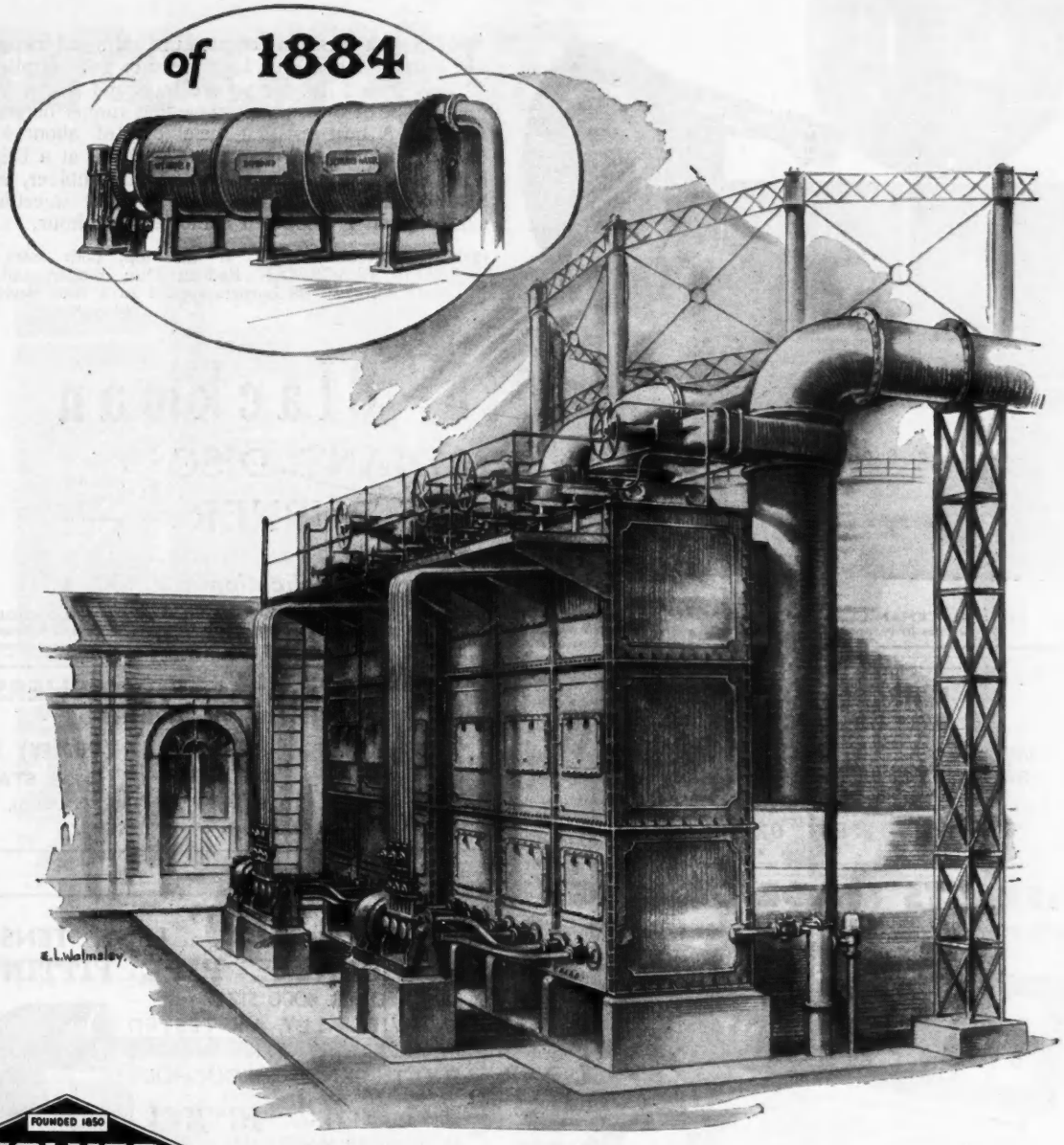
FLUXITE

IT SIMPLIFIES *ALL* SOLDERING

Write for Leaflets on CASE HARDENING STEEL and TEMPERING TOOLS with FLUXITE also on "WIPED JOINTS." Price 1½d. each.

Fluxite Ltd. (Dept. G.J.), Bermondsey Street, S.E.1

The New Patent Scrubber Washer



FOUNDED 1850
HOLMES
HUDDERSFIELD

MULTIFILM *Static* WASHER *of 1951*

W. C. HOLMES & CO. LTD. · HUDDERSFIELD · LONDON · BIRMINGHAM

Telephones: Huddersfield 5280 London: VICtoria 9971 Birmingham: Midland 6830 © 354

THIS is a medium temperature infra-red radiant heat burner for use on high pressure gas supplies only, say 3 to 5 lbs. per square inch, and it can be fitted to any type of oven or any travelling tunnel or stationary tunnel. A heat-resisting metal disc of about 4 inches diameter forms the radiant and operates at a bright red heat. The disc is mounted in a cast iron holder, and each holder is fed by its own high pressure injector. Gas consumption is about 20 cubic feet per hour.

THE illustrations show, at the top, both sides of the KEITH BLACKMAN Radiant Disc Burner, and at the bottom six of twelve burners applied to a paint drying oven.

Keith Blackman
RADIANT DISC
GAS BURNER

Price on application

KEITH BLACKMAN LTD., MILL MEAD ROAD, LONDON, N.17. TN: TOTTENHAM 4522. TA: "KEITHBLAC NORPHONE LONDON."
Branch Offices in Manchester, Birmingham, Leeds, Newcastle-on-Tyne, Glasgow, Penarth nr. Cardiff, and Belfast. Works: London and Arbroath.

J. BROWN & CO. LTD.
SAVILE TOWN, DEWSBURY, YORKS.

Supply:–
"BROWNOX-de-LUXE" PURIFYING MATERIAL
Purchase:–
SPENT OXIDE

JOINTS, GASKETS, WASHERS,
in RUBBER or ASBESTOS
CENTRAL MANFG., & TRADING CO. (DUDLEY) LTD.
OLD HILL **STAFFS.**
PHONE: CRADLEY HEATH 69181 (5 LINES).
"EVERYTHING IN ASBESTOS."

RETORTS MADE GAS TIGHT
when patched with–

ONX SUPER 83 BRAND **FIRE CEMENT**

A recent testimonial from Gas Dept.
"We are pleased with results obtained after using ONX Super '83' Brand. "Our settings were very bad, with large cracks in retorts, and portions of wall actually collapsed.
"Now, six months after repairing 28 retorts they appear as sound as ever; we anticipate the life of the settings will be prolonged."

A. L. CURTIS & CO., *Westmoor Works,* **CHATTERIS,** *Cambs., Eng.*

"WASK" HIGH TENSILE
MALLEABLE PIPE FITTINGS
OVER 4000 SIZES
INDIVIDUALLY AIR TESTED
STANDARD TAPER THREADS
FULL THICKNESS THROUGHOUT

Fit and forget!

MADE BY THE MAKERS OF–
"Wask" Up and Down Patent Lamp Suspenders, the NON-DISCONNECTING raising and lowering gear.

WALTER SLINGSBY & CO., LTD.
NEW DAM WORKS - - - KEIGHLEY
Phone: Keighley 3749 (2 lines). 'Grams: Malleable Keighley

ALEXANDER WRIGHT & CO. LTD

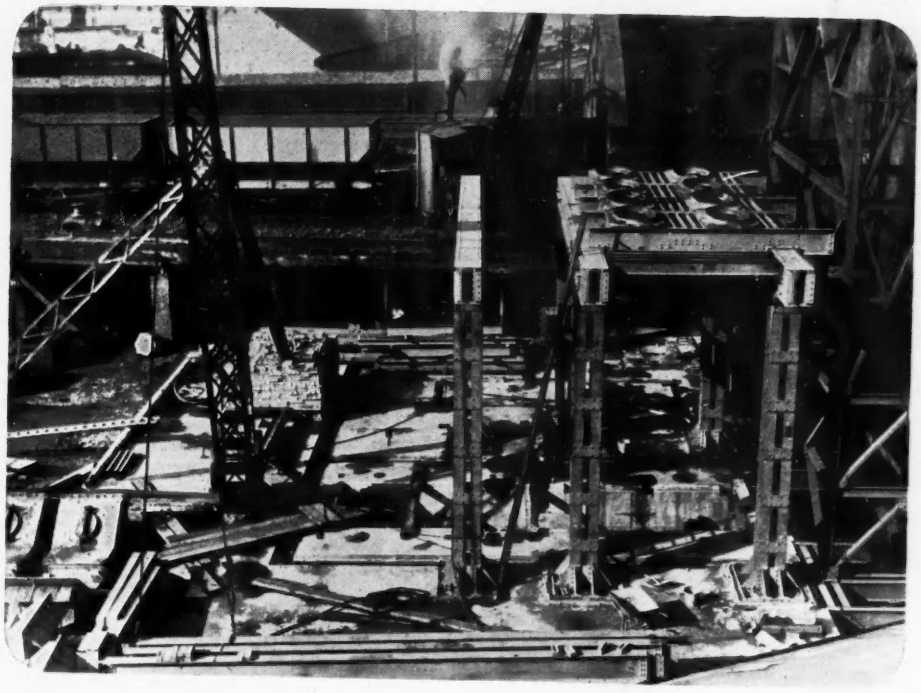
1, Westminster Palace Gardens, WESTMINSTER, S.W.1

INSTRUMENTS for Works and Laboratory.

Gauges and Recorders; Main and Dial Thermometers; Orsats; Gas Testing Apparatus; S. G. Bell and Gravitometers; Recording Calorimeters; Boys' Calorimeters; GLCC Hygrometers; Wet Meters.

Printed by STRAKER BROTHERS LTD., E.C.2, for WALTER KING, LIMITED, 11, BOLT COURT, FLEET STREET, LONDON, E.C.4. Wednesday, September 5, 1951.

Work in progress



BLYTH

Main Stanchions and Girder-Floor for an extension of Glover-West Vertical Retorts.

West's Gas IMPROVEMENT CO., LTD.

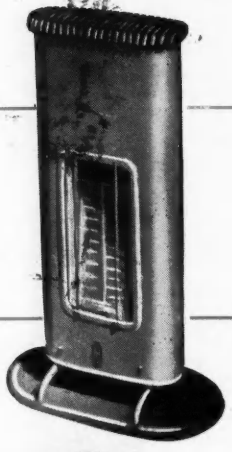
MILES PLATTING, MANCHESTER, 10

Telephone: COLlyhurst 2961–5. Telegrams: Stoker, Manchester.

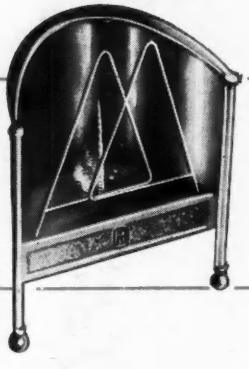
London Office: COLUMBIA HOUSE, ALDWYCH, W.C.2. Telephone: HOLborn 4108–9. Telegrams: Wesgasco, Estrand.

These gas fires are easy to sell

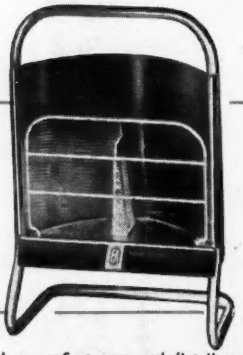
F. A. Neat gas fires incorporate Neat gas jets. They are silent, safe and cannot light back, yet give perfect combustion with exceptional heat output for gas consumed. All are made of fine quality materials by the makers of the famous Ascot gas water heaters and to the same high standards. They can easily be carried from room to room.



CONVECTOR FIRE, FA/7.
An attractive background heater, fitted with four Neat burners which heat a pair of fire-clay radiants. Ideal for halls or landings. Finished in cream, heat-resisting enamel with chromium plated top.



'MIJ' PORTABLE GAS FIRE, FA/8.
Has an unbreakable chrome steel radiant and three Neat burners. Finished in heavy chromium plate and processed aluminium. Suitable for small rooms or localised heating.



PORTABLE GAS FIRE, FA/3.
Also has an unbreakable chrome steel radiant of high efficiency. The reflector is chromium plate on heavy brass and the remainder of the heater cream enamel. Ideal for the medium sized room.

Sole manufacturers and distributors

ASCOT GAS WATER HEATERS LTD. ASCOT *43 PARK STREET · LONDON · WI · GRO 419*